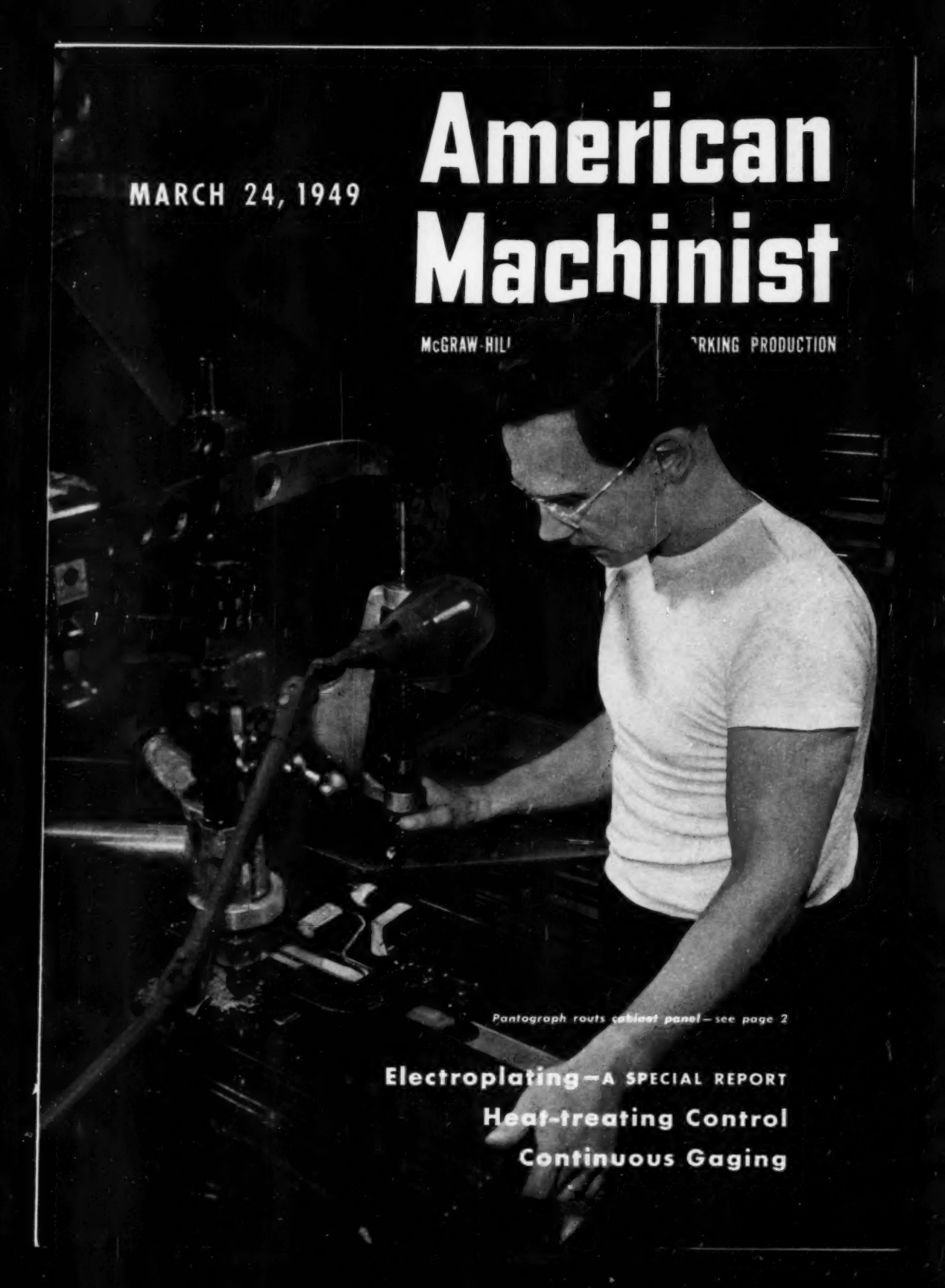
MARCH 24, 1949

American Machinist

McGRAW-HILL ...RKING PRODUCTION



Pantograph routs cabinet panel—see page 2

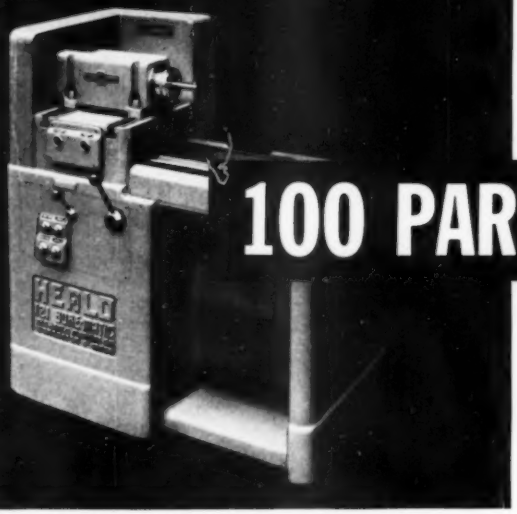
Electroplating—A SPECIAL REPORT

Heat-treating Control

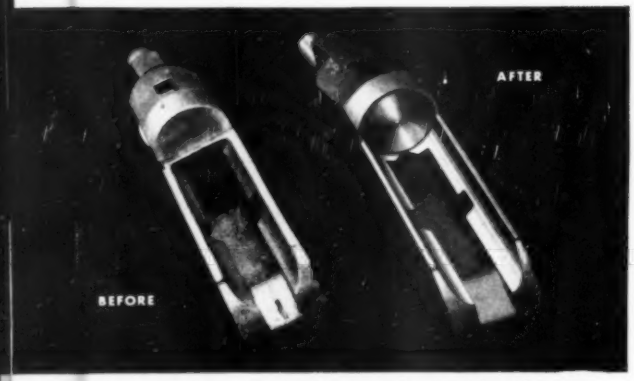
Continuous Gaging

Production increased from 60 to:

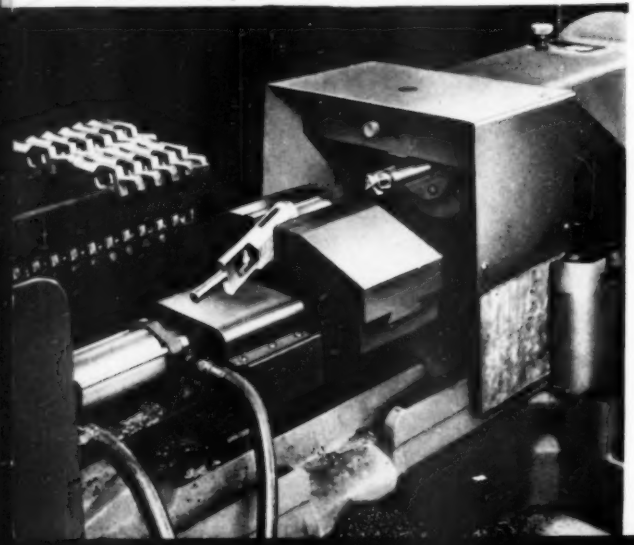
100 PARTS PER HOUR!



This Heald Model 121 Bore-Matic is ideally suited to high production requirements on small work, like the parts shown below.



These malleable-iron gun barrel frames are bored and faced in one high speed automatic machine cycle. The four-lip end mill cutter and clamping fixture used are shown below.



Gun barrel frames now finished faster, easier, and at lower cost on a small Heald Bore-Matic

It doesn't always take a big machine to make a big difference in your production schedules. Here's a typical case where the smallest single-end Bore-Matic in the Heald line practically *doubled* production for a manufacturer of firearms.

The gun-barrel frames shown at the left were formerly bored and face-milled in a hand-feed machine, with a maximum output of from fifty to sixty parts per hour. But when the new Heald Model 121 Bore-Matic took over the job, production immediately jumped to one hundred parts an hour! The machine cycle is fully automatic—all the operator has to do is load and unload the parts and throw the starting lever. It's not only easier and faster, but produces a more even bore and a better finish.

Whatever the job, chances are there's a new Heald machine that can do as much, or more, for you. And there's a Heald representative near you who will be glad to show you how. Why not get in touch with him today?

HEALD

PRECISION INTERNAL AND SURFACE GRINDERS

PRECISION BORE-MATIC FINISHING MACHINES

THE HEALD MACHINE COMPANY

Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton • Detroit
Indianapolis • Lansing • New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

CONTENTS for MARCH 24, 1949

VOL. 93, NO. 6

Cover.....*Operation pictured is described on page 2*

ADMINISTRATION

Editorial.....*Burnham Finney* 89
Down Went the Dignitaries.....*E. J. Tangerman* 91
The Lost Thousandth.....*Round Table* 106
Fight Socialism in Washington.....*James H. McGraw, Jr.* 130

SPECIAL REPORT

Principles of Electroplating.....*H. E. Linsley* 107

ENGINEERING

Investment Casting on a Shoestring.....*K. W. Thompson* 104
Estimating Upset Forgings.....*(RBS)* 141

HEAT TREATING

What's Inside Temperature Controls?.....*David Fidelman* 94

INSPECTION AND ASSEMBLY

Continuous Gaging Averages Stock Thickness.....*A. C. Sanford* 100
Pen and Ink Mark Gages.....*R. Kaden* 123
Olds Gasket Glued to Cover.....*Chester S. Ricker* 125
Stepped Plug Gage Speeds Internal Grinding.....*G. R. Milner* 127
Adaptable Gage Checks Internal Grooves.....*S. R. Welling* 127
Three Peg-Spanner Wrenches for Assembly..*R. B. Wolverhampton* 129
Ring Gages Check Taper Against Master Plug....*C. D. Mackinnon* 130

MATERIAL CUTTING, FORMING

Crush Ground Profiles Cut Costs.....*C. D. Caulton & J. E. Safhill* 98
Tong Transfers Ring Gear.....*Roger Isetts* 126
Beveled Edges on Gears Smooth Meshing.....*C. D. Mackinnon* 127
Stop Locates Short Turning.....*Grover C. Russell* 129
Lathe Reference Scale Speeds Turning Work.....*K. Clark* 129

TOOLING

Short Cuts.....*A. H. Waychoff* 124
Heavy Sine Plate Mounts Light Grinding Work....*Allan B. Nixon* 125
Multi-Bit Tooling Replaces Solid Tool.....*Arthur Silvester* 126
Double Tool Setup Cuts Double Threads.....*Wilson A. Beard* 126
Squeezing Extends Length and Life of Boring Bit....*G. R. Milner* 128
Drill-Rod Punch Cuts Cost.....*Stephen Penasack* 128
Scriber Finds Centers of Grooves and Cavities.....*C. G. Rimmel* 129
Strip-Steel Notching.....*Chester S. Ricker* 130
Chuck Centers Air Gun to Centerdrill Billets.....*K. C. Bland* 130
Thread Chasers Turn Chamfers on Lifting Hook..... 130
Straight Cut-Off Blades.....*(RBS)* 145

NEWS OF METALWORKING

Spot News..... 85
Gaging Metalworking..... 86
Detroit News..... 138
Names in the News..... 190

DEPARTMENTS

Tips to Top Shop Men..... 124
Reference Book Sheets..... 141
Talking Shop..... 147
Shop Equipment News..... 148
Parts and Materials..... 164
Round Table Discussions... 168
Quotes..... 186
New Books..... 189

Free Literature Available 194A

BURNHAM FINNEY.....Editor
E. J. TANGERMAN.....Managing Editor

Associate Editors: RUPERT LE GRAND, BEN C. BROSHEER (Chicago), ANDERSON ASHBURN, H. E. LINSLEY, CHESTER S. RICKER (Detroit), MILES J. ROWAN

Assistant Editors: CHARLES D. EMERSON, EILEEN ERSHLER, LIONEL J. HOLMES (News)

SYDNEY OXBERRY.....Art Director
RICHARD ROOMAN.....Assistant
ANNE PALMER.....Makeup

DEXTER KEEZER..Director, Economics Dept.

RUSSELL F. ANDERSON..Editor, World News

GEORGE E. DOYING, JR.....Washington

FRED H. COLVIN.....Editor Emeritus

ALBERT HAUPTLI.....Publisher
WILLIAM E. KENNEDY.....Asst. Publisher

District Managers: JOHN H. KOCH, M. A. WILLIAMSON, JR., Statler Building, Boston, Mass.; JAMES A. McGRAW, HUGH BRITTON, 330 W. 42nd St., New York 18, N. Y.; DAVID G. JONES, Architects Bldg., 17th & Sansom Sts., Philadelphia 3, Pa.; RAY DEEN, ANSON E. MEANOR, 520 N. Michigan Ave., Chicago, Ill.; ADOLPH F. TISCHER, Hanna Bldg., Cleveland, O.; ROBERT H. ANDERSON, 1110 Delta Ave., Cincinnati, O.; PHILIP G. WEATHERBY, Penobscot Bldg., Detroit, Mich.; JOHN W. OTTERSON, 68 Post St., San Francisco, Calif., CARL DYSINGER, 621 So. Hope St., Los Angeles, Calif.; R. C. MAULTSBY, Rhodes-Haverty Bldg., Atlanta, Ga. Other offices: Continental Bldg., St. Louis, Mo.; National Press Bldg., Washington, D. C.; Oliver Bldg., Pittsburgh, Pa.; Aldwych House, Aldwych, London, W.C. 2.

Member of ABP and ABC.

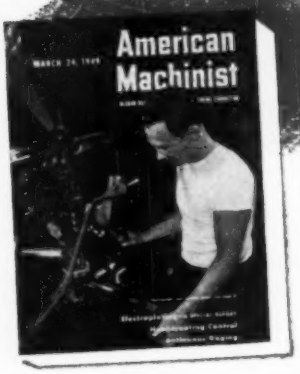
COPYRIGHT 1949 by McGraw-Hill Publishing Company, Inc. All rights reserved.

Published every other Thursday. Price 35c per copy. Allow ten days for change of address. Subscription Rates: United States and possessions, $5 a year, $8 for two years, $10 for three years. Canada, $6 for one year, $10 for two years, $12 for three years. Pan-American countries, $10 for one year, $16 for two years, $20 for three years. All other countries, $20 a year, $30 for two years, $40 for three years. Please indicate position and company connection on all subscription orders. Entered as second-class matter, August 13, 1943, at Post Office, New York, N. Y., under the act of March 3, 1879. Printed in U.S.A. Return postage guaranteed.

American Machinist is indexed regularly in the Engineering Index and the Industrial Arts Index.

PUBLISHED BY McGRAW-HILL PUBLISHING COMPANY, INC.
330 West 42nd St., New York 18, N.Y.
Cables: "McGRAW-HILL, New York"

James H. McGraw (1860-1948), Founder; James H. McGraw, Jr., President; Curtis W. McGraw, Vice-President and Treasurer; Eugene Duffield, Executive Assistant for Publications; Nelson Bond, Director of Advertising; Joseph A. Gerardi, Secretary; J. E. Blackburn, Jr., Director of Circulation



Chips and QUIPS

Our Cover . . . Side pieces of a radio cabinet are being contoured on a pantographic router in our cover Kodachrome. Taken at Westinghouse, it shows a new Micarta laminate which can be formed into fully interchangeable and highly accurate molded sections. Sheets of phenolic-treated kraft paper are built up to the desired thickness, surfaced on one or both sides with special-print phenolic or melamine impregnated sheets, and molded in chrome-plated molds. A gloss or satin finish can be obtained, and any desired surface pattern to imitate wood or cloth. The material is highly resistant to scratching, alcohol, boiling water and cigarette burns.

Electroplating . . . Special reports sometimes delve into subjects on which there is no "how to" literature (or very little), such as cold heading, swaging and precision casting. For contrast, the one in this issue digs into a subject on which there is a lot. Associate Editor Linsley found all kinds of material on electroplating—the problem was to condense it into a comprehensible and useful 16 pages. He did it—and had it checked by several top-flight platers. They were enthusiastic, and we hope you will be too.

Change . . . From time to time, we change things just to keep from going stale. Thus, in this issue you'll find a new arrangement of Shop Equipment News, with four solid pages to start, a 30% increase in length of the department, and the makers' names set separately for ready reference. . . . We've also moved "Talking Shop" back to the same area. Comments?

Electronics . . . Now and again, we've detected the stirrings of real interest in electronics among our readers. We've tried to supply a nonterrifying diet on the subject, in the form of a series of short articles and a special report, plus numerous articles showing applications. Latest in this series is a 2-part story on heat-treating control, by David Fidelman, who has a first-class background on electronics, thus can compare newer control types with the standard ones.

Quick Takes . . . We like to include, in the mixed reading diet of each issue, one or more articles that get an idea across quickly. . . . There are two in this issue, one describing the use of crush-grinding in an English plant making telephone jacks, the other explaining how Kollsman Instrument marks gages with the most readily available materials—pen and ink.

Investment . . . The number of precision casters shrank markedly after the war. To make a pun, investment casting took too much investment. Now K. W. Thompson, who has made both equipment and castings, tell show he built the works for a thousand dollars.

Magnetism . . . Some months ago, we dropped in to visit O. S. Walker, retired these twenty years, aged and infirm, but with a very active mind, a clear memory and an aliveness not shared by many men a score of years his junior. He told us something of his early struggles and of the development of the magnetic chuck. We present his story herewith as a documentary on a man and an idea.

Coming . . . April 7 *A.M.* will include a short special report, picturing and describing unusual Metalworking applications of light drillpresses. . . . Accompanying it are three articles on fixtures, one on heat-treat, one on stress-relieving welds and one on machining large interchangeable parts. We have pictures and data on a number of production setups for induction heating from Tocco, and descriptions of some projection gaging fixtures and those for making the Olds rocker arm. . . . N. N. Sawin tells about interchangeability on large parts, and David Fidelman continues his series on controls for heat-treating. . . . Then we have a "special"—Managing Editor Tangerman's ideas about shop training for engineers, with pros and cons from many engineering-college deans.

AUTOMATIC INSPECTOR . . . **A. C. Sanford is one New Yorker who left town. He went through the city public schools, Townsend Harris Prep, and even the College of the City of New York. In 1935 he went to work for R. H. Macy—and after three years decided retail merchandising wasn't his line. During the next three years he got a taste of trouble shooting and a start in the field of measurement, first with Chevrolet, next with Sun Mfg. of Chicago.**

He joined Federal Products in 1942 as an inspector and moved up to foreman of machine-shop inspection. In 1944 he was shifted to sales engineering on indicator gages, but for the past three years he has dealt with automatic and semi-automatic inspection machines and continuous-measuring gages, working in the field everywhere east of the Mississippi. His experience is reflected in his article in this issue.

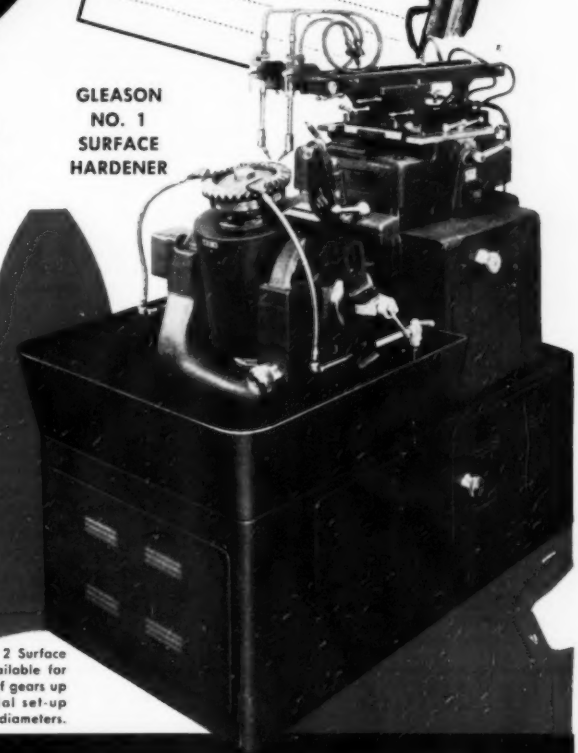
DISTORTION-FREE GEARS *for Longer Life*

GLEASON NO. 1 SURFACE HARDENER

SPECIFICATIONS*

CAPACITY:

Maximum Pitch Diameter	
Bevel Gears	24"
Spur and Helical Gears	34"
Internal Gears (max. outside dia.)	24"
Largest Pitch	1½ D.P.
Smallest Pitch	24 D.P.
Longest Face	5½"
Range in Number of Teeth, 5 to 200	



GLEASON NO. 1 SURFACE HARDENER

In the surface hardening of gear teeth, the Gleason Surface Hardeners provide a low-cost, practical method for obtaining hardened gears with a wear resistance devoid of distortion. Gear teeth are hardened with absolute uniformity . . . mechanical features include pre-heating teeth and s[illegible] of burner travel near ends of teeth to prevent overheating. Entirely automatic in operation, the machine indexes mechanically and follows the curvature of [illegible]ed-tooth gears. The only attention required of the operator being to start the machine and chuck gears.

Cut ge[illegible] in the soft . . . add [illegible]/10 to your cutters . . . harden [illegible] finished . . . eliminate spoilage, [illegible]rantee longer life and more accurate gears.

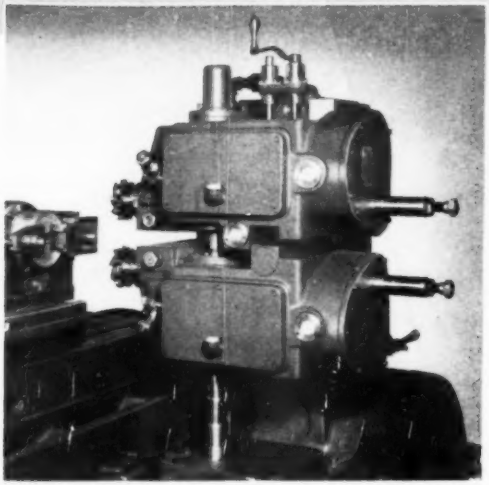
For further information write for descriptive [illegible] "Surface Hardening of Gear Teeth."

GLEASON Works
1000 University Avenue
Rochester 3, N. Y., U. S. A.

"A Gleason No. 2 Surface [illegible]ener is available for [illegible]e hardening of gears up to 120". Special set-up beyond these diameters.

Builders of Bevel Gear Machinery for Over Eighty Years

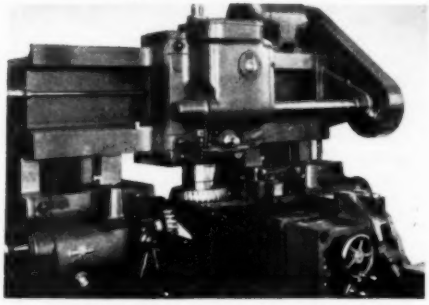
PRE-FAB HYDROMATIC UNITS
Give you a choice of
SPINDLE HEAD ARRANGEMENTS



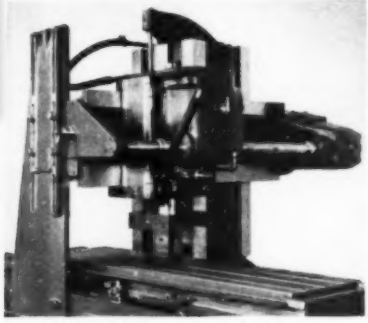
Close-coupled spindle carriers, above, replace the standard spindle carrier on a No. 34-36 Plain Hydromatic. In one pass two opposite slots are milled in aluminum pistons at a rate of 41 per hour.

New methods hold far more attraction to management when standard or semistandard equipment can be used. In general, capital investment is lower, and if the need arises, the machines can readily be refitted and used for other purposes. These two outstanding advantages are offered by CINCINNATI Hydromatic Milling Machines. Built up on standard plain and duplex styles, these machines are designed to give you a selection of standard and complementary units such as:

1. Close-coupled spindle carriers, illustrated at left
2. Vertical spindle heads, single or close-coupled
3. Fixed height or adjustable bridge type rail support (below) for vertical spindle heads
4. Extra wide bed for increased capacity



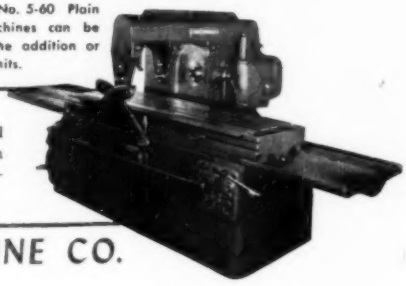
The illustration above shows a vertical spindle carrier on a fixed height rail applied to a No. 45-60 Duplex Hydromatic. This equipment mills the top, bottom, and pad on cylinder blocks.



Left: Vertical spindle carrier on a variable height rail with outboard support, converts this No. 46-72 Hydromatic into a general-purpose, automatic cycle vertical milling machine for large work.

CINCINNATI

Right: Standard CINCINNATI No. 5-60 Plain Hydromatic Miller. These machines can be changed to suit the job by the addition or substitution of many pre-fab units.



Perhaps the milling operations on parts in your shop could be combined at a big saving. The standard and complementary unit construction plan of CINCINNATI Hydromatics offers many possibilities. May we send engineering data? Ask for catalog M-1372-1.

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

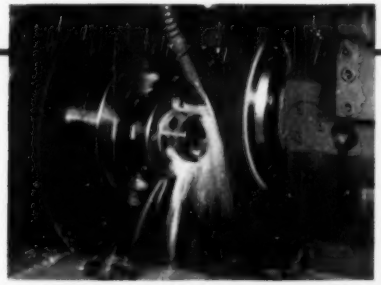
Make it your first choice

for precision grinding a variety of small work

...CINCINNATI FILMATIC 10" HYDRAULIC UNIVERSAL

An exceptionally wide variety of small work can be precision ground to advantage on CINCINNATI FILMATIC 10" Hydraulic Universal Grinding Machines. Four examples are shown here. Machine features which expand the variety of work include hinged internal grinding head. The wheelhead may be swiveled more than 90 degrees, right and left. Headstock spindle speeds are instantly and infinitely variable from 60 to 600 rpm. A jog button stops the headstock spindle rotation where desired. To all these features of variety, add the advantages of FILMATIC Grinding Wheel Spindle Bearings (no adjustment or maintenance attention ever required) and you have a universal grinder which will be the best first choice for your shop ... CINCINNATI FILMATIC 10" Hydraulic Universal. You may obtain additional information by writing for catalog G-577.

Above: Grinding the taper end of an aligning bar. Tapers up to 4½" per foot may be ground on CINCINNATI FILMATIC 10" Hydraulic Universals.

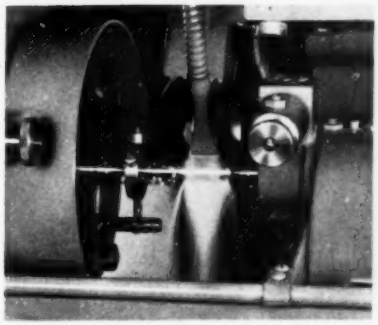


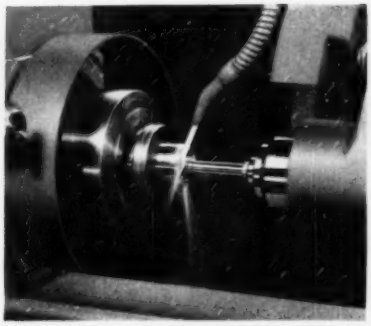
Above: Grinding the small diameter of a flanged bushing.

Right: Grinding a short two-diameter shaft by the traverse method.

Extreme right: Grinding the bore of a flanged bushing held in a chuck.

FILMATIC



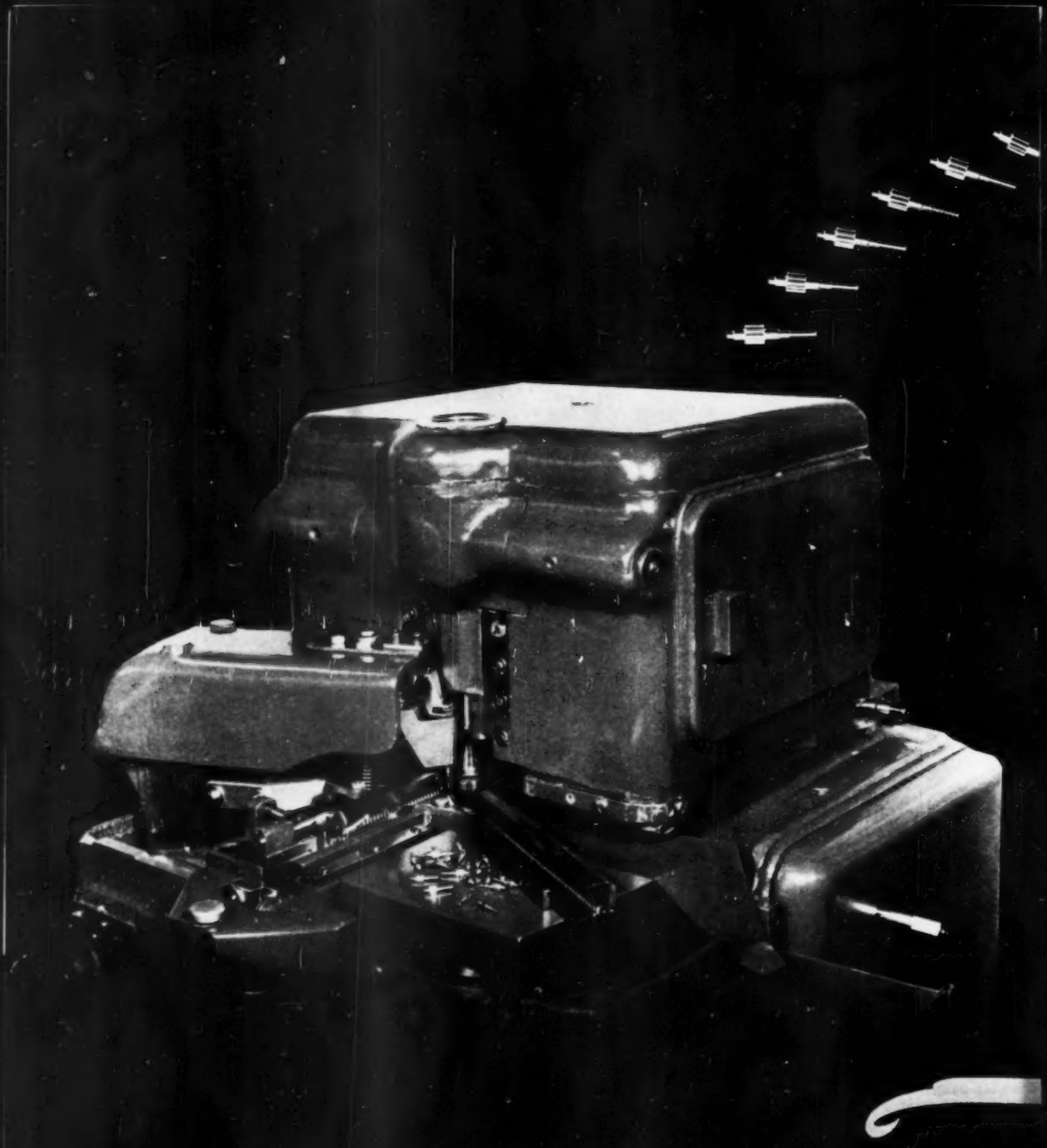


CINCINNATI

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES



GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

5,000 finished pinions in 8 hours

Performance like this is typical of the Fellows Method applied to small gears and pinions. Faster output than sub-press dies. Higher accuracy, finer finish, and up to 64, 80 or even 200 pitch. That's the cost-saving story on this "small gear speedster" of the Fellows Line—the No. 3 Fine-Pitch Gear Shaper.

With magazine feed and automatic work ejection it can be set up for record production on a wide variety of small gears and pinions. Cutter speeds may be set at up to 2000 strokes per minute depending upon the work.

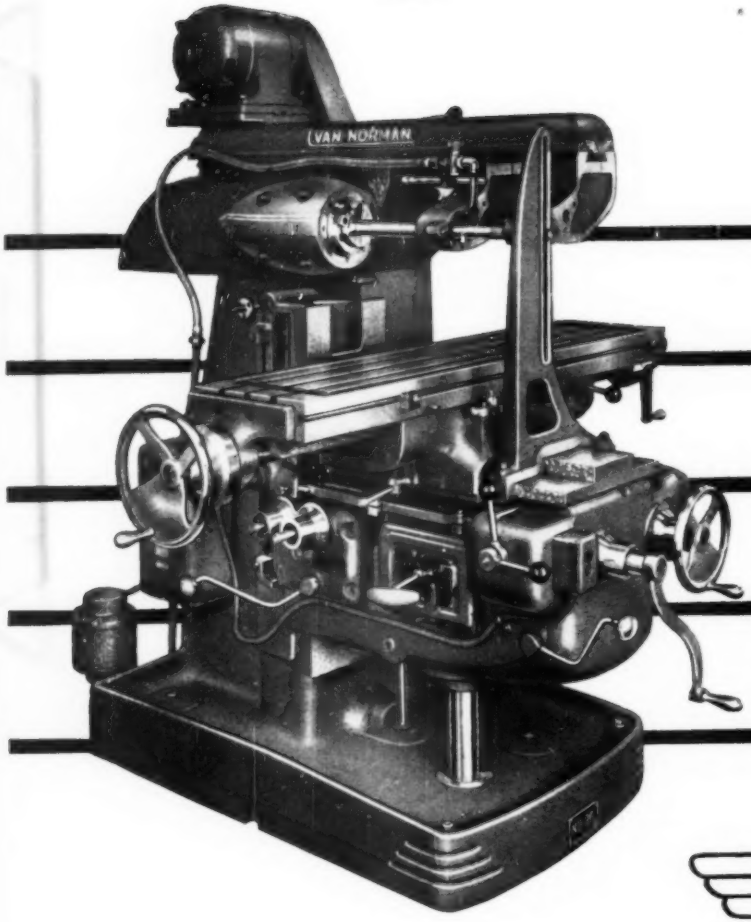
Whatever your present method of turning out small gears, the production possibilities of this Fellows machine make it worthy of investigation. An inquiry addressed to the office nearest you will bring descriptive literature, or any special data you may request.

Fellows 3 in. Fine-Pitch Gear Shaper

Fellows

THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont
Branch Offices: 616 Fisher Bldg., Detroit 2 • 640 West Town Office Bldg., Chicago 12 • 7706 Empire State Bldg., New York 1.

5 REASONS ...with Van Norman



No. 36 With adjustable cutterhead mounted in horizontal milling position.

"It Pays to Van Normanize"

WHY YOU PROFIT

Ram Type Milling Machines

Adjustable Cutterhead permits you to perform horizontal, angular or vertical milling all on one machine . . . minimizes work setups . . . cuts idle operator and machine time up to 50%. In addition, this versatility enables you to meet daily job to job milling requirements.

Increased Range—the adjustable cutterhead and movable ram provide maximum milling capacity and versatility.

Front and Rear Finger-tip Controls of all power feeds, six way rapid traverse and hand adjustments provide extreme ease of control . . . reduce work fatigue . . . improve accuracy. Power controls operate in the desired table, saddle and knee movement assuring maximum simplicity of operation.

Single Lever Feed Selector provides quick, easy selection of the proper feed for the type of work being milled. 18 feeds are instantly available from front or rear operating positions.

Long Life Accuracy is assured by the precision rigid Van Norman construction. Hardened alloy steel gears and multi-splined shafts operate on anti-friction bearings . . . automatic lubrication assures thorough oiling of all moving parts . . . massive knee, saddle and table assemblies provide rigidity.

Investigate Van Norman Ram Type Millers today. They are available in many models and sizes, with plain or universal saddles, to meet every requirement for toolroom, laboratory, machine shop, pattern shop and general purpose milling.

VAN NORMAN COMPANY

SPRINGFIELD 7, MASSACHUSETTS

PIPE NIPP

450 pieces
3600 pieces

WORLD'S LARGEST MANUFACTURER OF ALL TYPES

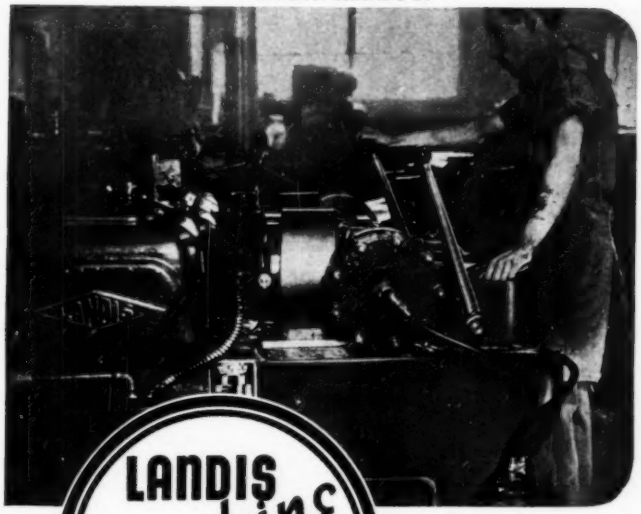
LES

per hour
per chaser grind

Such production is proof of "high production and low cost"—yet thread tolerances are held to specifications. These figures are production results of a manufacturer producing steel pipe nipples, using LANDMACO machines equipped with air-operated carriage fronts. Different conditions might make an even higher output possible.

LANDMACO Pipe and Nipple Threading Machines thread, ream, and chamfer in one operation. Built in 1¼" and 2" single- and double-head models, these machines are equipped with either internal or external trip heads.

Write for Bulletin D-84



LANDIS MACHINE COMPANY
ENGINEERING DATA
Name of Part 3/4" x 2 1/2" Pipe Nipple
Material Galv Butt Weld Pipe
Thread Pitch 14
Thread Limits ± 1 1/2 Turns
Thread Length 13/16"
Cutting Speed 33 Ft. P.M.
Pieces per Hour 450
Chaser Grind 22° and 88°
Pieces per Chaser Grind 3600

ENGINEERING DATA
Name of Part 3/4" x 10" Pipe Nipple
Material Butt Weld Pipe
Thread Pitch 14
Thread Limits ± 1 1/2 Turns
Thread Length 13/16"
Cutting Speed 38.3 Ft. P.M.
Pieces per Hour 400
Chaser Grind 22° and 88°
Pieces per Chaser Grind 3400

ENGINEERING DATA
Name of Part 2" x 6" Pipe Nipple
Material Butt Weld Pipe
Thread Pitch 11 1/2
Thread Limits ± 1 1/2 Turns
Thread Length 1"
Cutting Speed 42.8 Ft. P.M.
Pieces per Hour 200
Chaser Grind 22° and 89 3/4°
Pieces per Chaser Grind 1800

ENGINEERING DATA
Name of Part 1 1/2" x 5" Pipe Nipple
Material Butt Weld Pipe
Thread Pitch 11 1/2
Thread Limits ± 1 1/2 Turns
Thread Length 1"
Cutting Speed 35.8 Ft. P.M.
Pieces per Hour 232
Chaser Grind 22° and 89 3/4°
Pieces per Chaser Grind 2000

LANDIS Machine COMPANY
WAYNESBORO PA., U.S.A.

OF THREADING EQUIPMENT

LANDIS TOOL

Microsphere Spindle Bearings

CUT GRINDING CYCLE TIME

LANDIS TOOL

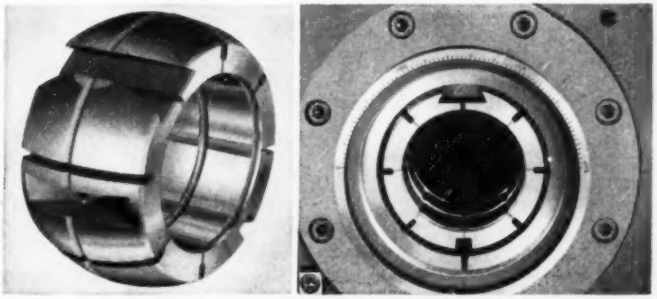
Precision Grinders

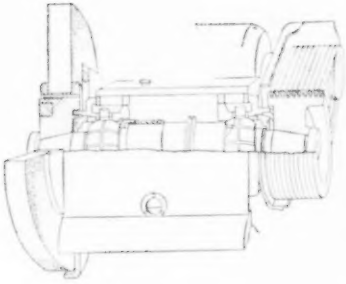
EQUIPPED WITH MICROSPHERE BEARINGS

For complete information on the features and specifications of LANDIS TOOL Precision Grinders refer to our section in Sweet's Catalog File or write for our new condensed catalog.

and INCREASE PRODUCTION

Grinding cycle time is influenced to a large extent by the sparkout period after wheel feed ceases. LANDIS TOOL has cut grinding cycle time materially by holding to a minimum the two most important factors that affect sparkout.





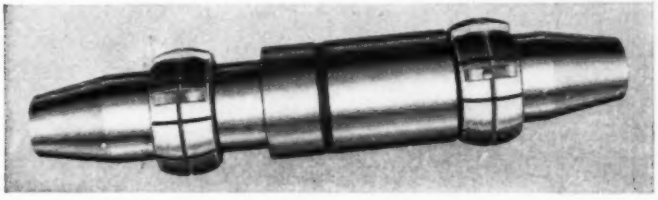
CLOSE SPINDLE BEARING CLEARANCE
with adjustable MICROSPHERE BEARINGS

Construction features of the one-piece bearing permit concentric adjustment for clearances.

When changing bearing clearance, widespread graduations give a visual indication of the change in "tenths" on bearing diameter.

GREATER STIFFNESS OF WHEEL SPINDLE
minimizes deflection while grinding

Spindle diameter is increased between bearings. This gives greater stiffness and less deflection than a single diameter spindle.



features of LANDIS TOOL Hydraulic Universal Grinders

1. MICROSPHERE WHEEL SPINDLE BEARINGS
2. EYE LEVEL WHEEL FEED
3. HYDRAULIC OPERATION
4. VARIABLE SPEED HEADSTOCK
5. RAPID HYDRAULIC WHEEL POSITIONING
6. SWINGING INTERNAL FIXTURE

LANDIS TOOL COMPANY, WAYNESBORO, PENNA.

For simple steel parts...

...and tricky ones, too

–you need this improved

MACHINABILITY

Regardless of the design of steel parts made on a mass production basis, your spread between profit and loss is determined in most part by the MACHINABILITY of the steel bars you use.

That makes MACHINABILITY vitally important –so important that Union Drawn has spent large sums in improving it to the present high levels found today in Union Cold Drawn Steels.

For 60 years, Union Drawn Metallurgists and Engineers have been making an intensive study of the machining characteristics of various steels. They have learned much–particularly how slight changes in chemistry and processing produce marked effects on speeds and feeds, tool life and machined surfaces. Each year they cut up tons of steel on an "automatic"–and spend long hours in customers' plants observing the performance of steels under actual operating conditions.

The results: (1) an unequalled knowledge of MACHINABILITY; (2) the development of new free-machining steels; (3) a continuous improvement in all Union Drawn Products from year to year.

Whether you make simple steel parts–or tricky ones–why not take advantage of the improved MACHINABILITY in Republic Union Drawn Bessemer, carbon, alloy and stainless steels–*plus* Union Drawn's metallurgical and engineering assistance? They can mean higher production efficiency, increased output, lower unit costs and better surface quality. And remember, too, that all types of furnace treatment are available to further improve your profit picture.

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic

REPUBLIC STEEL

UNION COLD DRAWN STEELS

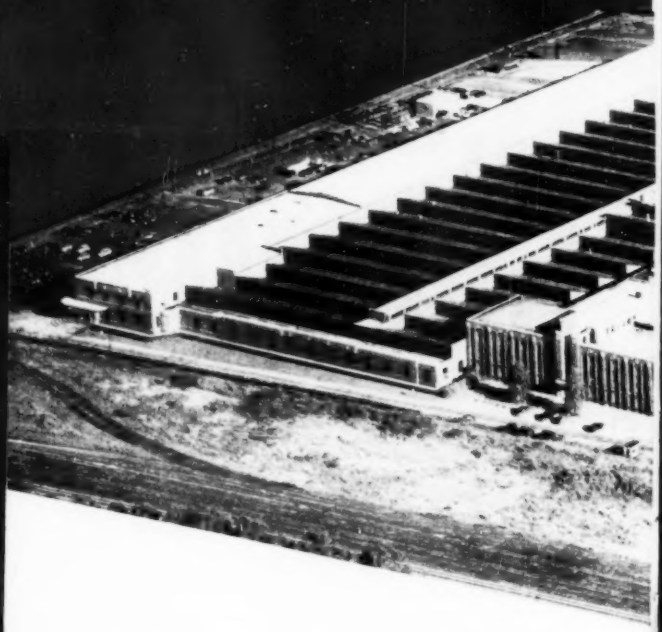
Free-Machining Bessemer, Alloy and Enduro Stainless Steels
•
Union Cold Drawn Special Sections
•
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting.)

More Chain··Better Chain·

LINK-BELT

ADDS FACILITIES TO MEET INCREASED DEMAND FOR ROLLER CHAIN AND SPROCKETS . . . .

. . . . . .



Link-Belt's addition to its Indianapolis chain plant makes possible immediate shipment ot precision steel roller chain and sprockets.

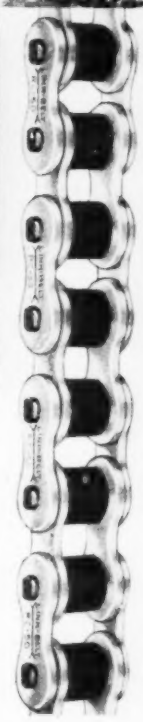
It is no longer necessary to substitute for roller chain. Flexible, positive, efficient Link-Belt Silverlink precision steel roller chain that will economically solve your power transmission and conveyor problems is now available.

Silverlink precision steel roller chain due to special features, has shock absorbing resilience.

Link-Belt manufactures a type of chain for every power transmission and conveying function.

···When You Want It!

Ewart Plant of Link-Belt Company
Indianapolis, Indiana



Our unsurpassed facilities and engineering knowledge are at your service. Your inquiries are cordially invited. Get in touch with our nearest office.

LINK-BELT COMPANY

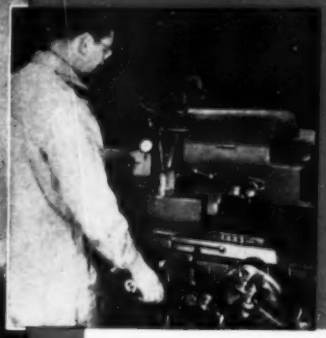
Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8. Offices, Factory Branch Stores and Distributors in Principal Cities.

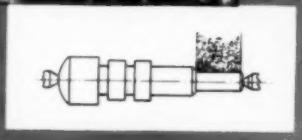
11.660

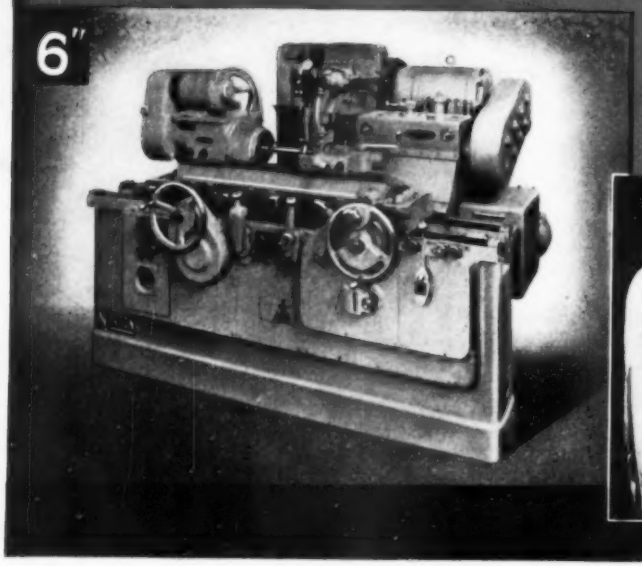
LINK-BELT CHAINS

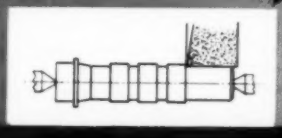
FOR DRIVES • FOR CONVEYORS • FOR POWER TRANSMISSION

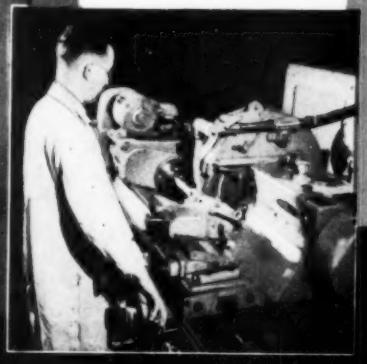
Want to Save on Your Plunge-cut Grinding?











There Are *Real* Cost-Cutting Features in NORTON SEMIAUTOMATICS

IF you are grinding plunge-cut jobs on plain grinding machines, it will pay you to investigate the NORTON Semiautomatics. Consistent savings are being obtained by users the world over because of cost-reducing features such as —

One lever control — allowing machine to make a complete grinding cycle, and then stop ready for reloading.

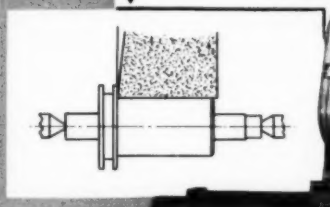
Ease of operation — less demands on the operator for handling, sizing and grinding skill.

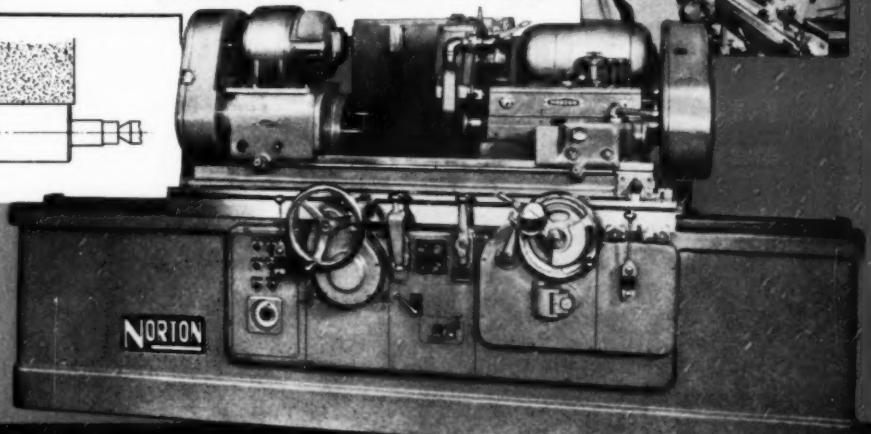
Enduring accuracy — based on the famous time-tested Norton grinding wheel spindle and feed mechanism designs.

Grinding Time Cut 30% or more!

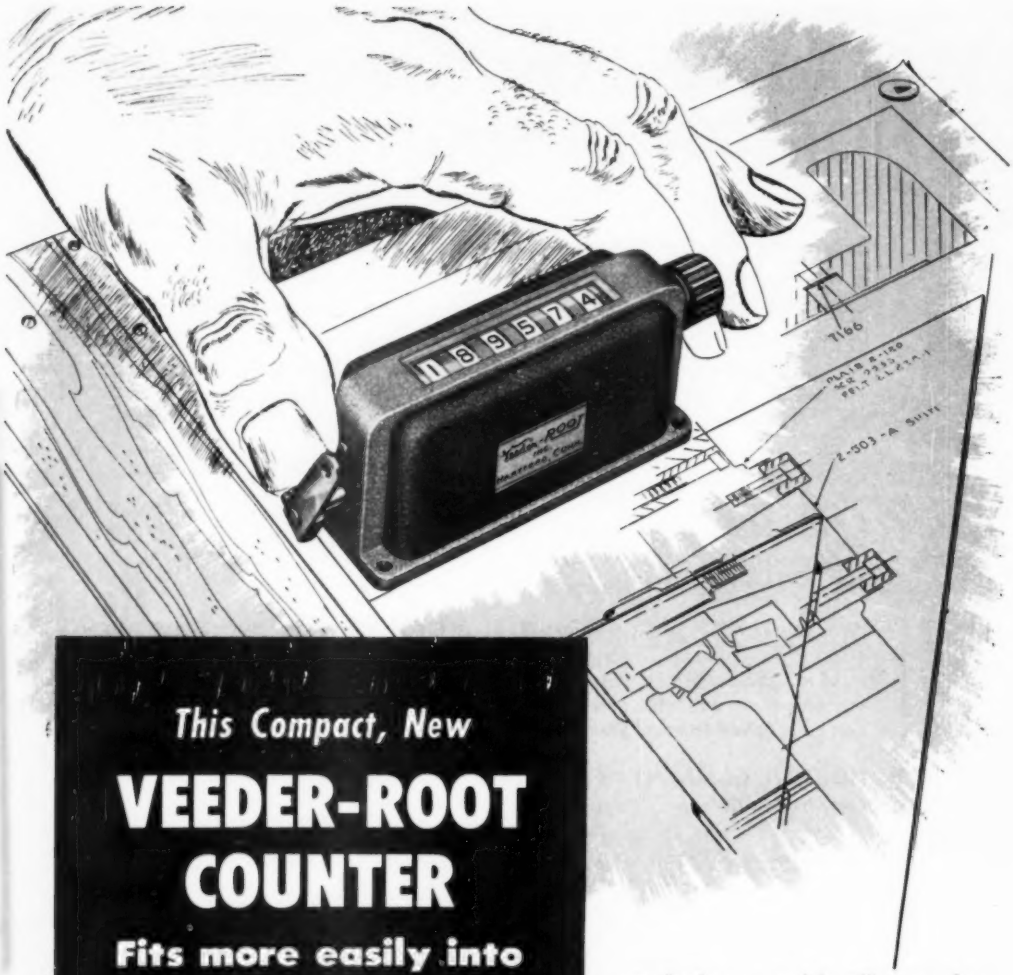
Available in 4" Type C, 6" and 10" Type CTU and 10" and 14" Type LCTU sizes. Readily adjustable for small-lot production runs. Many combinations of equipment are available and specialized work fixtures can be supplied to meet your production demands.

NORTON COMPANY, WORCESTER 6, MASS.
New York - Chicago - Detroit - Cleveland - Hartford
Distributors in All Principal Cities M-573





NORTON GRINDERS and LAPPERS



This Compact, New

VEEDER-ROOT COUNTER

Fits more easily into any product-design

Trim and slim as a fine timepiece . . . and even easier to read . . . this new general-purpose Series 1260 is the most important news in counters since the Veeder-Root bicycle cyclometer of 1868!

This eye-catching counter, richly finished in 2-tone grey to set off the "Ease-Eye" direct-reading line of 6 bold figures, will measurably add to the *appearance* . . . to the *utility* . . . and to the *marketability* of any machine or product into which it is built as an integral part. It will deliver continuous *Facts in Figures* on any phase of operation or production . . . and it will prove the product's guarantee.

And the new 1260 will fit into the closest design-limitations. For it measures only 4½" long, 1 9/16" high, 1½" wide . . . weighs only 12 ounces. Speeds from 1,000 to 5,000 counts per minute, depending on type of drive: ratchet, revolution, direct, or geared. Capacity is 1,000,000 counts. Then one turn of the knob resets to all zeros.

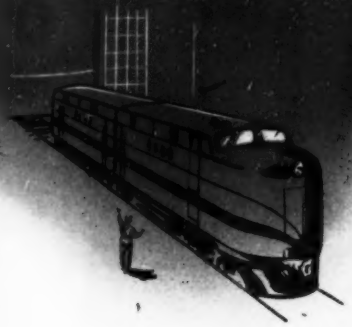
Look for this good-looking modern counter in the new machines and equipment you buy. And, by all means, look into its possibilities as a built-in *sales-builder for your own products.* Write.

VEEDER-ROOT INC.
Hartford 2, Connecticut

In Canada: Veeder-Root of Canada, Ltd., 995 St. James Street, Montreal 3. *In Great Britain:* Veeder-Root Ltd., Kilspindie Road, Dundee, Scotland

90 minutes...

TO COMPLETELY FINISH TURN THIS LOCOMOTIVE AXLE!

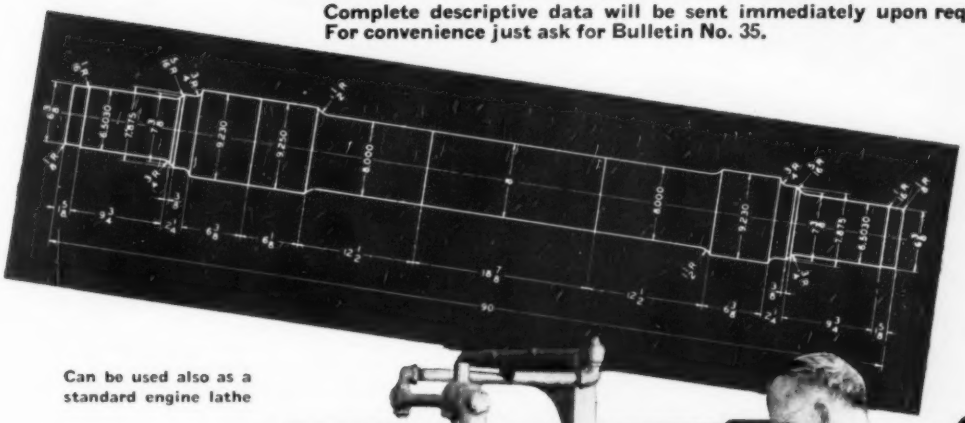


It usually takes about 8 hours to do this job. A saving of 6½ hours to finish this axle is a real saving in any railroad shop.

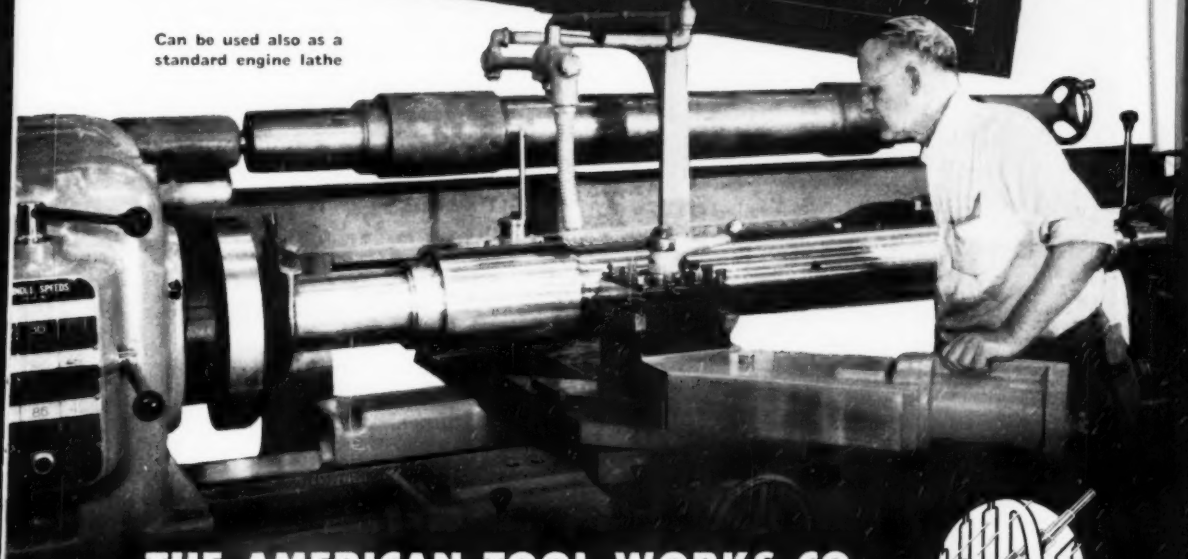
It proves conclusively that the new "American" Hydraulic Duplicating Lathe is a positive answer to lower costs in the railroad shops.

The new 25-inch "American" Hydraulic Duplicator on which this job was done has the enormous power, the unfaltering stamina and the ease of control which combine to make it the production marvel of the moment. Cost-minded executives from every quarter of this country and from many countries abroad have shown vital interest in this new machine. Many orders already have been placed and many machines now are in service breaking production records daily.

Complete descriptive data will be sent immediately upon request. For convenience just ask for Bulletin No. 35.



Can be used also as a standard engine lathe

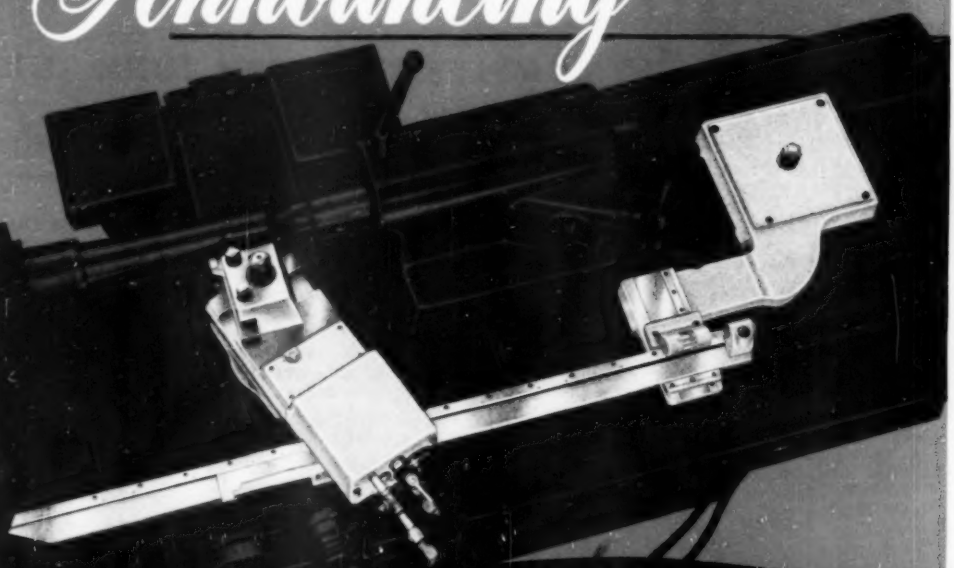


THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

Announcing



the new LeBlond Hydra-Trace Attachment for any LeBlond Heavy Duty lathe...

HYDRA-TRACE SIMPLICITY: Only 5 parts are required, thus simplifying operation, mounting and unmounting. 1. Tracer slide, 2. Template, 3. Template carrier, 4. Bed bracket, 5. Hydraulic tank and pump.

Hydra-Trace gives you better, faster automatic duplicating and here are 12 reasons why:

1. The new Hydra-Trace, a simple, heavy duty compound rest unit, performs practically all operations of form turning, contour facing, and step shafts.

2. It can be applied quickly and without any drilling or fitting to all LeBlond heavy duty engine lathes 12" to 50" sizes, the RT Series tool room and engine lathes, the plain and sliding bed gap lathes, and to the Rapid Production lathes.

3. Does not interfere with or limit cross travel. Your regular lathe operator can handle it without complications.

4. Diameters are adjustable by means of regular cross feed screw.

5. Makes available the full swing and center distance capacity of lathe.

6. It's mounted on special compound rest which is interchangeable with regular compound in a matter of minutes.

7. Hydra-Trace is sold as an attachment . . . you don't have to buy a complete lathe. You can use it on any identical size LeBlond lathe built since 1935.

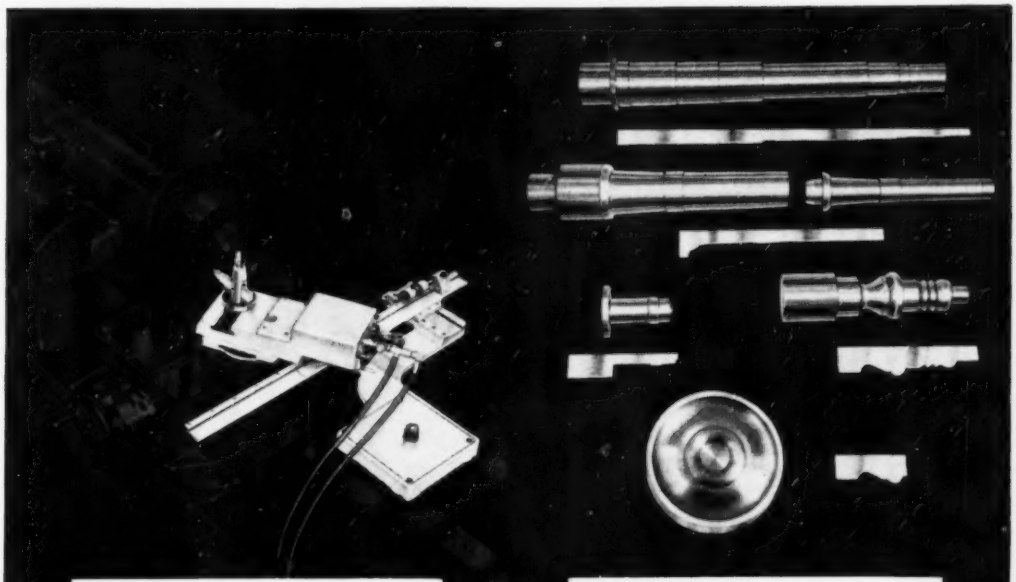
8. Template holder and all controls are conveniently located in front of lathe and there are no overhanging brackets or controls in rear.

9. Does not interfere with use of taper attachment.

10. Stylus control metering device built directly into compound rest.

11. You can use any standard or four-way tool block, and you can swivel the slide to suit most favorable angle for tool clearance.

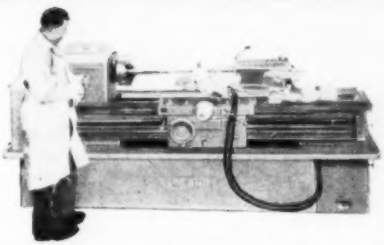
12. Feeds selected directly through regular feed box.



PROFILE FACING, easily, quickly accomplished by swinging template carrier and bed bracket as shown. Note controls are still in front of lathe. Photos show application on new 16" RT Series.

STEPLESS FORM TURNING, contour facing, and step shafts are all in the day's work for the Hydra-Trace. Templates are flat and can be made in your own tool room. Rough and finish turning with same template.

there's a Hydra-Trace for every LeBlond heavy duty lathe...



YES, AUTOMATIC HYDRA-TRACE duplicating is available for any LeBlond heavy duty from the 13" Rapid Production up to and including the 50" heavy duty engine lathe.

AND THERE'S PLENTY of power and capacity in every Hydra-Trace. Take the 16" size for example: with 3" top slide travel you can reduce shaft diameters from 4¼" to 6" by varying angle settings of the tracer slide. Shaft and profile facing jobs can be accommodated up to the full swing capacity of the lathe.

TRACE IT HYDRAULICALLY WITH THE HYDRA-TRACE . .

send us your tracings

GET THE HYDRA-TRACE FOR YOUR LeBLOND

For complete information on this productive new duplicator, send today for Bulletin HT-1. Please specify sizes of your LeBlond lathes. Address

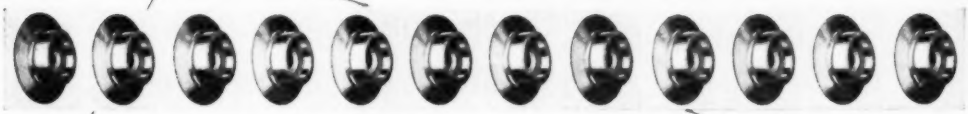
THE R. K. LeBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO, U. S. A.
LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES
SALES OFFICES: New York, Chicago, Philadelphia, Detroit.

COPYRIGHT LEBLOND 1949

LeBLOND

THREAD MILLING CUTTERS
PRATT & WHITNEY MAKES KINDS
Whenever you need milling cutters in a hurry, you'll find them quickly available in stock sizes directly from the P&W Factory or from the nearest Branch Office. You'll like the fast service.
METAL SLITTING CUTTERS AND ROTARY SLITTING DISCS
SHELL, SPIRAL CUT AND "HI-HELIX" END MILLS
. . . and you'll like P&W cutters, too. They are designed, machined, hardened and ground to famed P&W precision standards. They stand up under long and heavy service. Whatever the job, they deliver the goods.
You'll get the right tools at the right time at the right price when you order P&W Cutters. Consult your Pratt & Whitney Small Tool Catalog to select from the wide range of stock sizes and types, including inserted blade and other cutters not pictured on this page.
DIE SINKING CUTTERS
PLAIN, DOUBLE ANGLE, FORM, STAGGERED TOOTH AND INTERLOCKING SIDE MILLING CUTTERS
Pratt & Whitney
Division Niles-Bement-Pond Company
WEST HARTFORD 1, CONNECTICUT
KELLER CUTTERS
PROFILING CUTTERS
MILLING CUTTERS

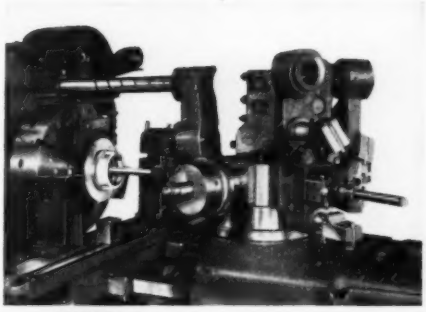
BECAUSE P&J TOOLING IS PRECISION BUILT

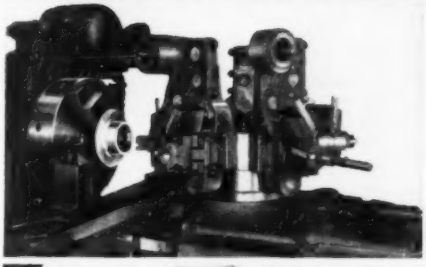


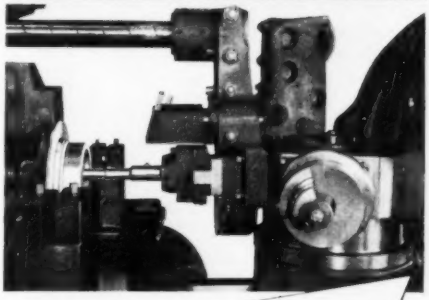
PRODUCTION MEN FIND

fewer rejects

FROM P&J AUTOMATICS







The automotive industry applies Potter & Johnston Automatic Turret Lathes extensively to quantity production of interchangeable parts, many so intricate that they require upwards of fifteen to twenty successive operations on one machine. Significantly, the modern quality control inspection methods used in the big automobile plants demonstrate the ability of P&J Automatics to produce work that meets these exacting standards . . . with fewer rejects.

Back of this successful performance record is P&J tooling . . . as planned with the aid of experienced P&J engineers who know how to work out a job — as indicated by these setups to produce the differential case pictured above — operation by operation in correct sequence, turret face by turret face. There is no substitute for the skill and know-how of these men. That is why Potter & Johnston machines plus P&J tooling mean better parts and more of them at lower cost. And that is why we suggest that it may be very much worth your while to send us sample parts or prints and see what we have to recommend.

AUTOMATIC TURRET LATHES

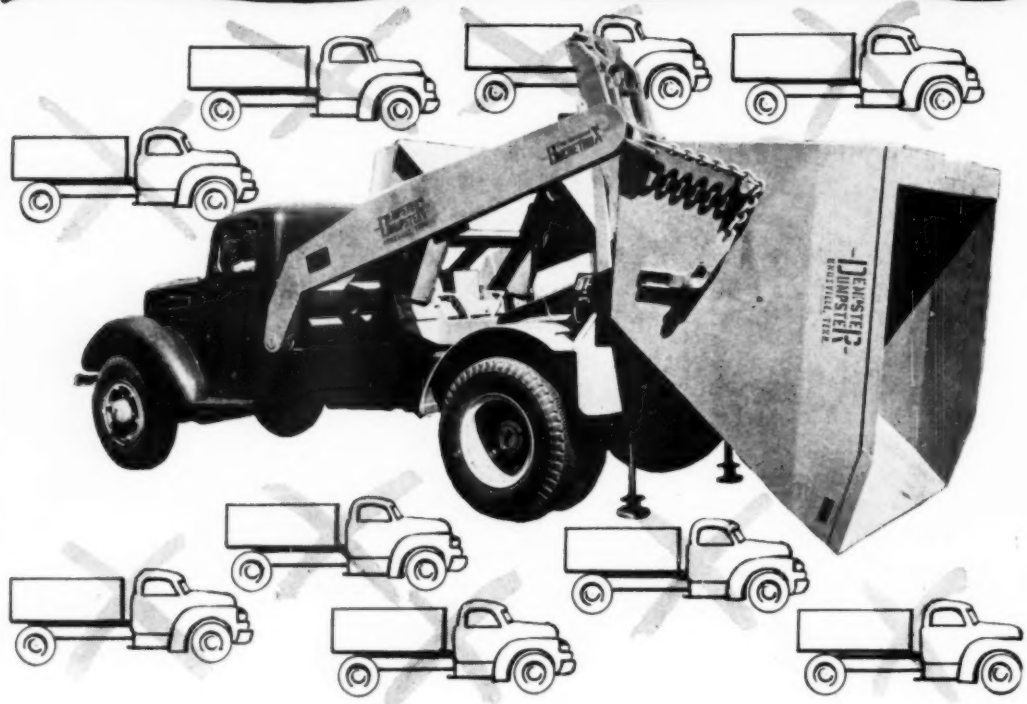
Potter & Johnston Company

Pawtucket, R. I.

subsidiary of Pratt & Whitney Division Niles-Bement-Pond Company

P&J

One Dempster-Dumpster with 99



Being a large operation, this copper smelter required ten trucks and their crews, a series of push cars, a train car system and loading crews to handle over twenty different kinds of materials on relatively short hauls between plant buildings and outside of the grounds. The materials handled included, scrap of all descriptions, trash, rubbish, new and used brick, excavation spoil, waste oils, filter cake, dust, sand, gravel, cement, fire clay and many others.

A large majority of the handling, re-handling, storage, truck and car equipment and crews standing idle, was eliminated by the Dempster-Dumpster System. Simply stated, this system provides quick pick-up of pre-loaded containers for hauling, dumping or moving material to another location. The three pictures below show how it operates. The left illustration shows the Dempster-Dumpster truck hoisting unit approaching a loaded container. Two chains are attached and the driver returns to controls in the cab. In the center photo, loaded container is hydraulically raised into carrying position. Controls in the cab permit dumping as illustrated at right. You too, may be able to adapt the Dempster-Dumpster System of Materials Handling to your business at tremendous savings. Let one of our engineers discuss this possibility with you.

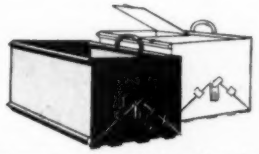
DEMPSTER BROTHERS, Inc.

Containers replaces 9 trucks....

Over $50,000 saved annually . . . in this Copper Plant through faster, more efficient, materials handling

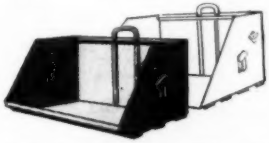
Here, in plain language, is what happened to Materials Handling costs after the Dempster-Dumpster System of Materials Handling was installed in a large Western copper smelting plant. A comprehensive Dempster-Dumpster survey had previously revealed costly delays, unnecessary handling and rehandling of materials, and much time wasted by loading crews. All have been eliminated to the tune of $50,000 savings annually. Fast pick-up, hauling and dumping of pre-loaded Dempster-Dumpster containers has replaced the old method of plant hauling. As a result, nine of the ten trucks formerly detailed for this work were eliminated or put on other work. Ninety-nine detachable containers, built in over 20 sizes and designs for the specific materials they were to handle, were spotted at material accumulation points throughout the plant. Some containers, provided with roller bearing casters, are rolled to indoor accumulation points. Some are handled by fork trucks, other by overhead cranes within plant buildings. As containers are filled, the Dempster-Dumpster truck hoisting unit and one man, the driver, picks each container up, hauls it to its destination, dumps it and returns the empty container for refilling or, loaded container is lowered at any point and left if desired. When you consider that pick-up and dumping of these detachable containers takes less than 60 seconds, and that the entire operation works to an on-the-run schedule, you will realize how one truck hoisting unit can handle 99 containers and do the work formerly requiring ten conventional trucks.

In the panel below are shown the basic types of Dempster-Dumpster Containers used in this installation. The basic containers can be altered with lids, casters, hose and chute connections, etc., to handle accumulations of any type material whether it be liquid, solid, dust, gas, light or heavy materials.

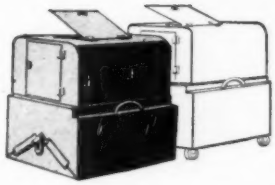


Forty-nine open top, drop-bottom containers in 3, 4, 8 and 10 cu. yd. capacities were spotted at 38 locations throughout the smelter operation. Four of these were 10 cu. yd. containers fitted with two end doors and a circular top opening for chute loading. Three of the 34—4 cu. yd. drop-bottom containers in this group were equipped with self balancing spring lids for special use.

Ten water tight, Tilt-Type containers were required to handle liquids or moist materials. Four of these were open top of 1½, 3 and 4 cu. yd. capacities for four locations. One 4 cu. yd. container with self balancing spring lids was provided at Lab Sample Mill. Three containers, with self balancing lids provided with pipe inlets, were supplied for receiving waste oil at three separate locations. Two 3 cu. yd. containers having three separate compartments with individual lids for each compartment, were required for the zinc electrolytic plant.



Two 4 cu. yd. skip-type, with lip, containers and two 4 cu. yd. skip-type, flat-bottom, containers were spotted at two locations. One 6 cu. yd. flat-bottom, skip-type container was furnished.

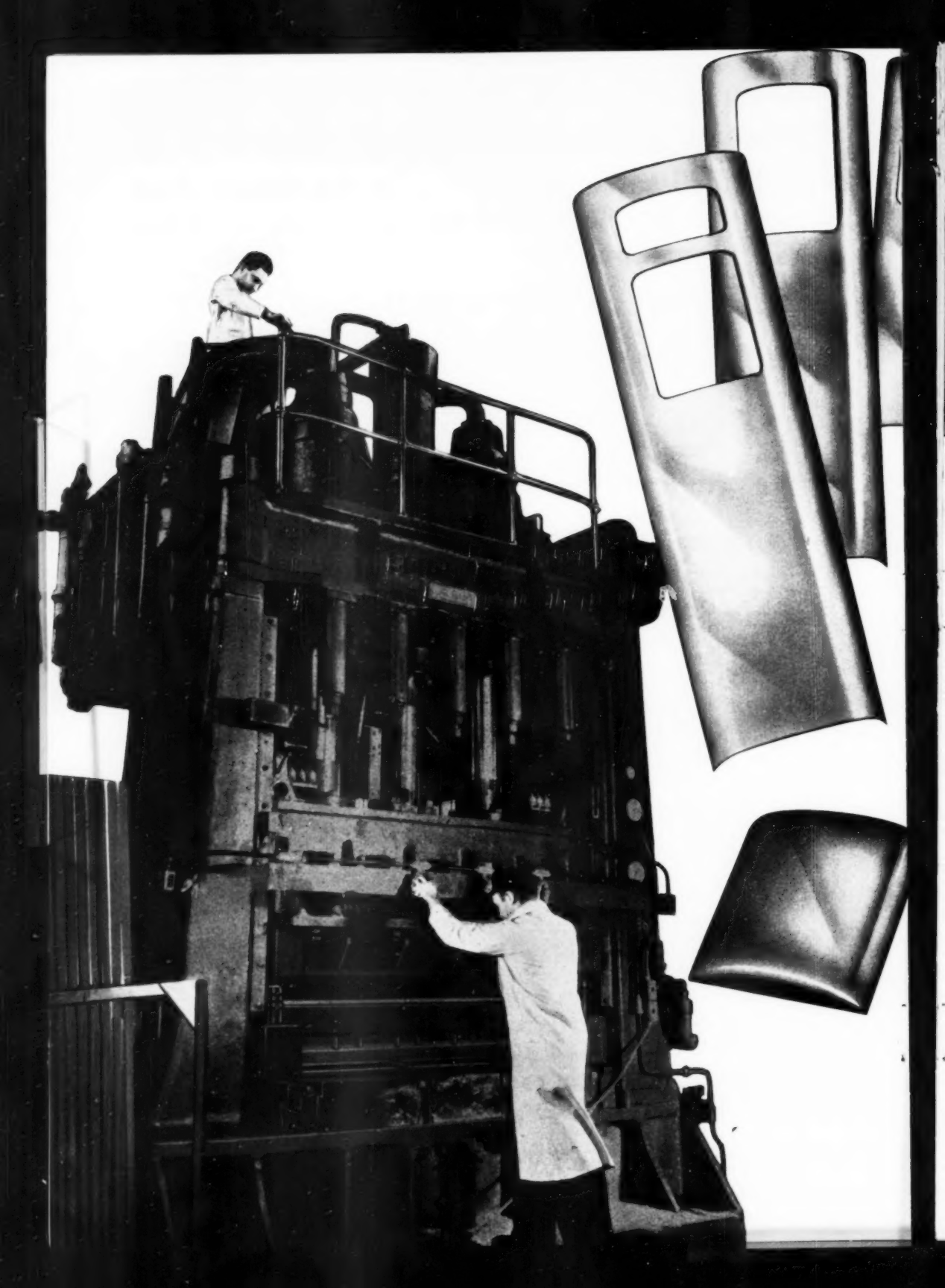


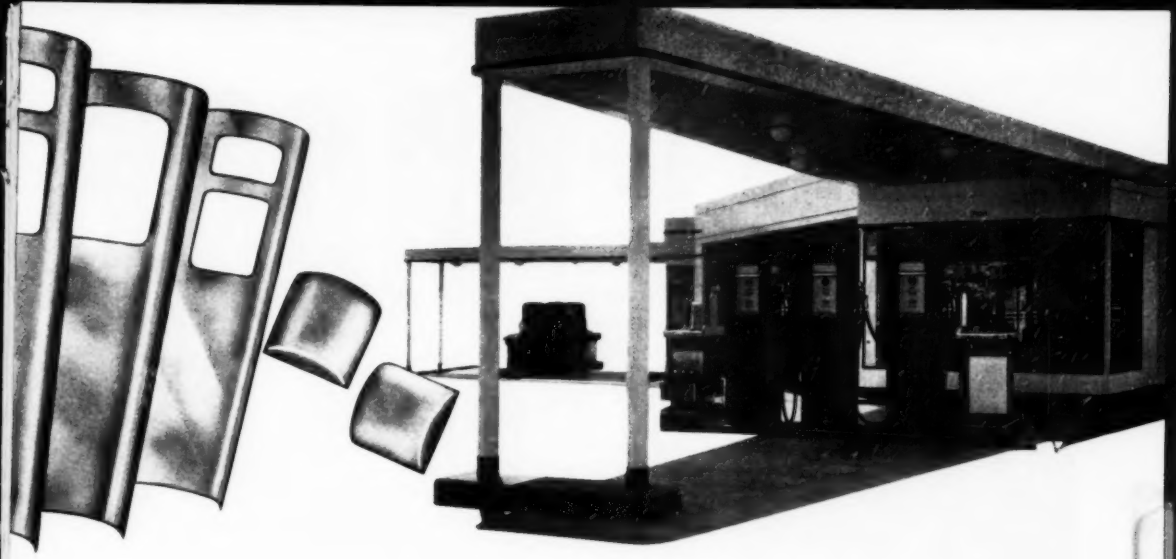
Thirty-three Universal-type containers in 6 and 10 cu. yd. capacities were spotted at 33 locations to receive trash, rubbish and other bulky materials. Two of these were mounted on roller bearing casters for movement to indoor loading locations.

Two 10 cu. yd. Apartment-type containers were spotted at the main office and laboratory office to receive large accumulations of waste paper and trash.

DEMPSTER DUMPSTER TRADE MARK REG. SYSTEM

439 DEMPSTER BUILDING, KNOXVILLE 17, TENNESSEE





TOKHEIM gasoline pumps begin on a "BALDWIN"

Millions of motorists throughout the country get their gas from the sleek-looking, streamlined gasoline pumps produced by Tokheim Oil Tank and Pump Company. The plant in Fort Wayne, Indiana, keeps its production and quality up, *and its costs down*, with the help of a 400-ton Baldwin Hydraulic Press, which forms the various pump panels in one positive, precise operation.

Tokheim is only one of many manufacturing organizations that have learned from experience how the features of Baldwin presses pay out in greater output, fewer rejects, and all-round lower costs. The adjustable ram stroke and press pressure—the full-pressure capacity throughout the entire stroke—the positive overload protection—the automatic slow-down—the quick, simple die set-up—these are only a few of the many outstanding advantages that make Baldwin Hydraulic Presses economical production aids.

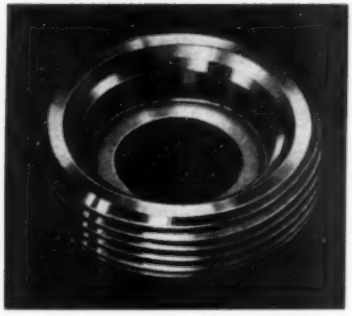
If you are thinking about installing a new press, or replacing an old one, send for Bulletin 285. It gives a concise story of the variety of presses produced by Baldwin, for forming and drawing . . . forging . . . extrusion . . . plate working . . . and dozens of other miscellaneous applications. No matter what your press need, you'll find it profitable to talk to Baldwin.

The Baldwin Locomotive Works, Philadelphia 42, Pa., U. S. A. Offices: Boston, Chicago, Cleveland, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Seattle, St. Louis, Washington. In Canada: Baldwin Locomotive Works of Canada, Ltd., Toronto, Ontario.

BLW THE BALDWIN GROUP **BALDWIN**

HYDRAULIC PRESSES

here is PROOF



1

UNIT COST GOES DOWN!

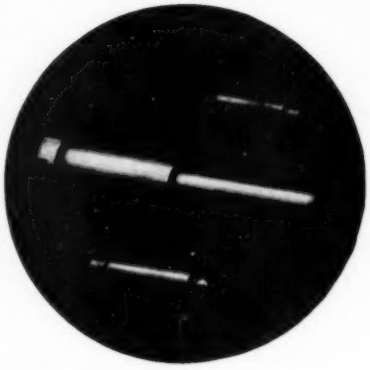
At first this bearing race job was classed as "impossible"—slow production, excessive rejects and a high unit cost. But now that Carpenter Stainless No. 8 (Type 303) is on the job, *each unit costs only five cents, tool life has doubled and rejects have dropped by 40%.*

2

Saved:

$456.00 EACH YEAR ON TOOL REGRINDING!

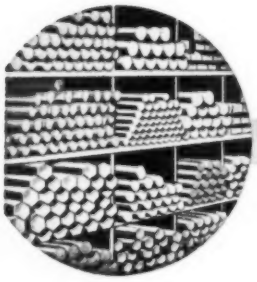
The cost of each Stainless part is bound to come down when you make a saving like that. *Tool life jumped from a few hours to over 15 days, plus the fact that less down time on machines gave the company production time for over 23,000 extra valve needles per year.* Small wonder that the company is pleased with Carpenter Stainless No. 8 (Type 303).



3

REJECTS REDUCED 50%!

Rejects of precision instrument parts were cut in half when this firm started using Carpenter Free-Machining Stainless No. 5 & No. 8. With a large investment in labor and materials, the company had *good reason for specifying Carpenter on every Stainless bar stock order.*



WHEN YOU WANT *Rush* DELIVERY CALL YOUR *Carpenter* WAREHOUSE -

BOSTON	CINCINNATI	HARTFORD	PHILADELPHIA
BRIDGEPORT, CONN.	CLEVELAND	INDIANAPOLIS	PROVIDENCE
BUFFALO	DAYTON	LOS ANGELES	ST. LOUIS
CHICAGO	DETROIT	NEW YORK	WORCESTER, MASS.

SEE YOUR CLASSIFIED TELEPHONE DIRECTORY

that you can reduce unit costs by using *Carpenter* Free-Machining Stainless

4

PRODUCTION UP 25%!

The Plant Manager told us that he has tried many Stainless Steels, and is convinced that Carpenter Stainless No. 5 provides the best finishes and *machines 25% faster than competitive materials.*

To get results like these time after time, the Stainless that feeds into your machines has to be *uniform* from bar to bar. It has to work the same in your machines month after month. And that is just why you need Carpenter Free-Machining Stainless on your jobs!

If you want positive proof that you can reduce your unit costs with *consistently uniform* Carpenter Free-Machining Stainless bar stock—do this. Place your next production order with the nearest Carpenter warehouse listed below. Send your order to Carpenter and find out for yourself that—

YOU CAN TURN IT OUT AT LESS COST

WITH *Carpenter* FREE-MACHINING STAINLESS

"Big Help to Getting More Parts From Every Pound of Stainless" . . .

That is what customers say about the Carpenter "NOTEBOOK on Machining Stainless Steels" with its 96 pages of useful information on Turning, Drilling, Tapping, Threading, etc. For your copy, just drop us a note on your company letterhead. Extra copies of the NOTEBOOK, for the men in your plant, are available at 50¢ each.

more than corrosion resistance

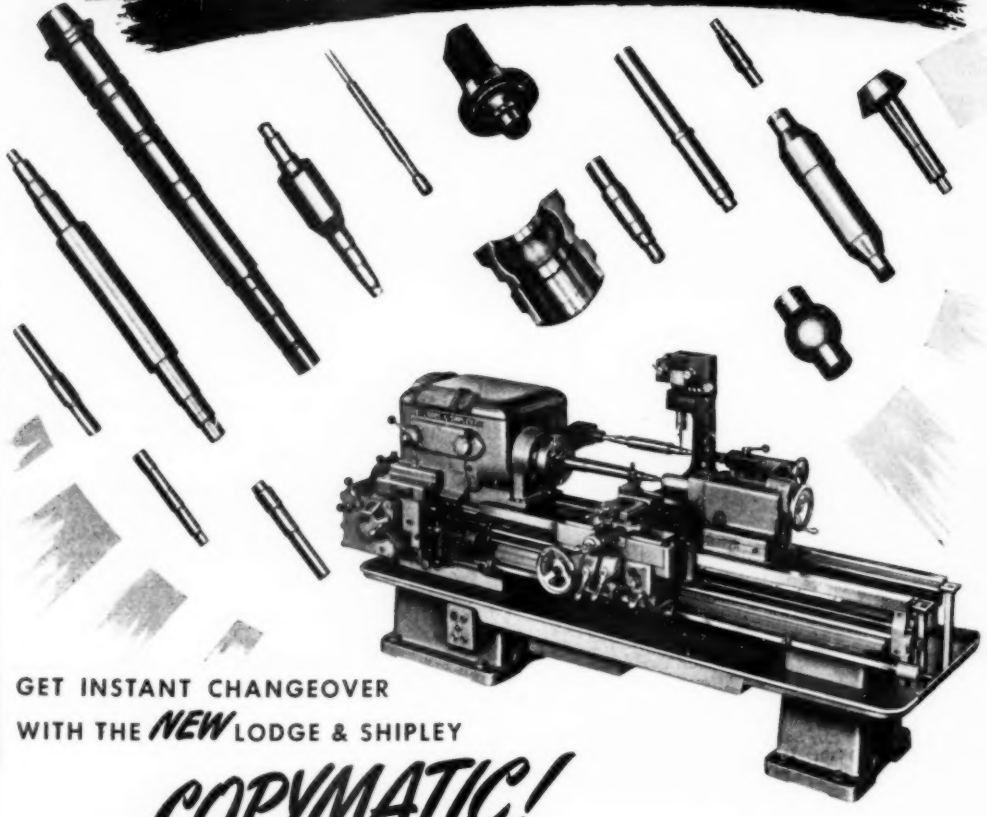
THE CARPENTER STEEL COMPANY, 109 West Bern Street, Reading, Pa.

Export Department: 233 Broadway, New York 7, N.Y. "CARSTEELCO"

Carpenter **FREE-MACHINING**

STAINLESS STEELS

DUPLICATE PARTS LIKE THESE
...or do Regular Lathe Work!



GET INSTANT CHANGEOVER
WITH THE *NEW* LODGE & SHIPLEY

COPYMATIC!

FROM either round or flat templates, duplicating various shapes is quickly accomplished with the new COPYMATIC Lathe. Duplicate to close limits square shoulder faces, grinding necks, tapers in both directions, chamfers and curved contours. Best of all, this latest type Lodge & Shipley "Model X" Lathe is not a special purpose machine; it operates as a regular engine lathe, too.

It takes no time at all to change from automatic tracer controlled duplication to regular lathe operation (or vice versa). There are no complicated adjustments . . . no adding or removing of tricky gadgets. Often, the need for a special template is eliminated. The first piece of a lot can be machined by standard operation, placed in the template holder and used to produce the remainder of the lot automatically.

The speed and convenience of automatic duplication, coupled with proven "Model X" efficiency is an ideal combination for more profitable production. Investigate today. Call your Lodge & Shipley Representative or write direct for Bulletin No. 675.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

THE GREENFIELD STORY

"Quality Control"

MORE and more the need for quality control grows on modern management. It cuts down the wasteful scrap heap. It develops a reputation that builds sales. "Greenfield" recognized this at the turn of the century when it designed its own gages to check its threading tools. "Greenfield" sold the first commercial thread gages in 1908. In World War I, the government turned to "Greenfield" for gage-making leadership. Ever since, "Greenfield" has been a headquarters for quality control on threading operations. To obtain maximum precision without sacrificing mass production means the right tools—taps, dies AND gages. For intelligent, resultful help in the selection and use of the right threading tools and gages, *you have available a local "Greenfield" distributor and trained "Greenfield" threading engineers.*

GTD

GREENFIELD TAP and DIE CORPORATION
Greenfield, Massachusetts

and

GEO MET RIC

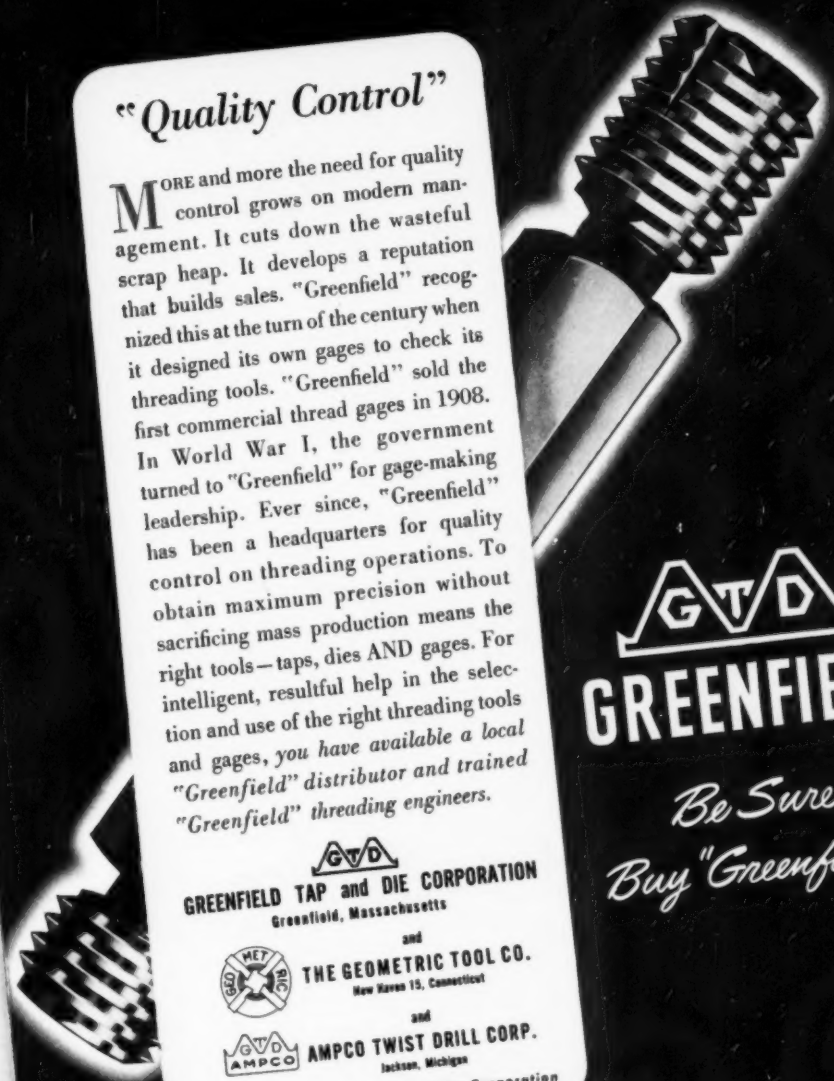
THE GEOMETRIC TOOL CO.
New Haven 15, Connecticut

and

GTD AMPCO

AMPCO TWIST DRILL CORP.
Jackson, Michigan

Divisions of Greenfield Tap and Die Corporation

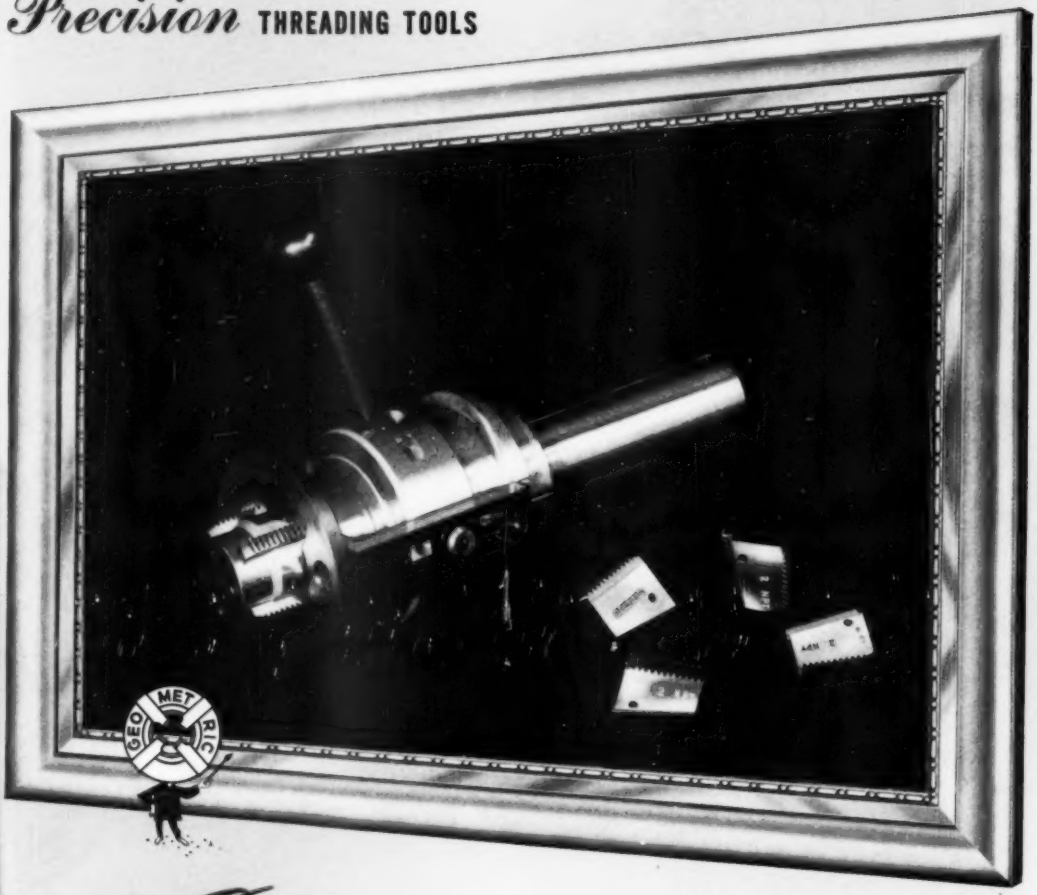


GTD

GREENFIELD

Be Sure
Buy "Greenfield"

Precision **THREADING TOOLS**



Collapsing Class S Tap and Chasers

A Universal Collapsing Tap for Stationary and Rotary use.

★ ★

Available for tapping diameters from 1 5/16" to 8½".

★ ★

GEOMETRIC also makes a complete line of Self Opening, Stationary and Rotary Die Heads and Solid Adjustable Taps. *You are invited to write today for further details.*

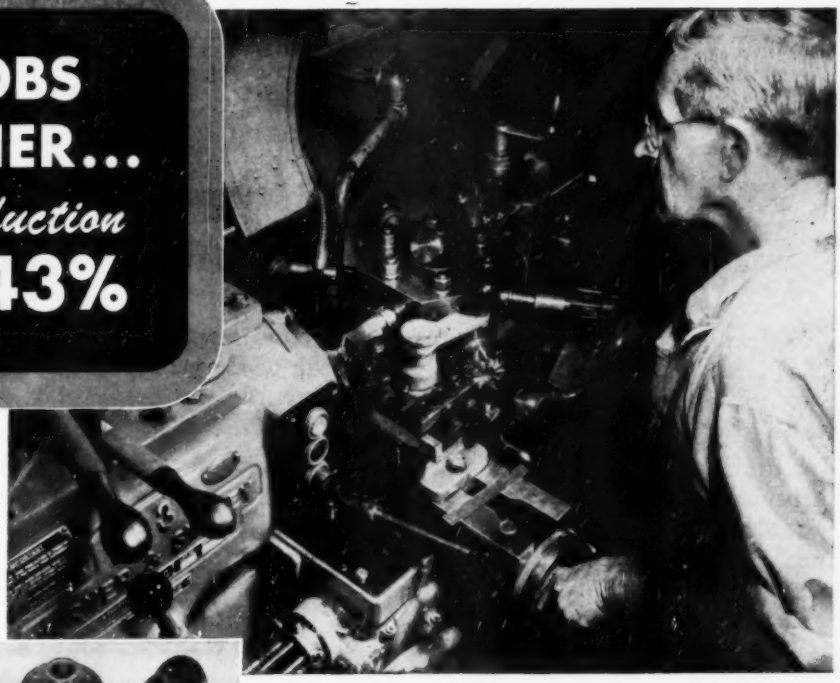
"Be Sure ... Buy Geometric"

THE
GEOMETRIC
TOOL COMPANY, NEW HAVEN 15, CONNECTICUT

GTD

GTD AMPCO

JOBS EASIER... *Production up* 43%



The O. M. Edwards Co. does all these jobs on its No. 3 Warner & Swasey. Materials range from alloy steel forgings to hard bearing bronze. Lots vary from 8 to 1500 pieces. Average production has increased 43%.

THE O. M. EDWARDS CO., INC., of Syracuse works in hard metals such as nickel silver, specializing on accurate parts for the trap doors, retractable steps and double glazed windows they supply for modern railroad equipment. They recently installed a new Warner & Swasey No. 3 Universal Turret Lathe. Here is what they found . . .

Their operators prefer to run the new machine because it takes less manual effort.

Close limits are held more accurately.

The parts have better finishes.

Small lots—1 to 10 pieces—handled as well as long runs.

There is an all-over average of 43% more parts produced.

Installation of modern Warner & Swasey Turret Lathe machines has proved profitable for the O. M. Edwards Co. —why not see how a new Warner & Swasey can help you? Call the nearest Warner & Swasey representative or write—

You can machine it Better, Faster, for less... with a Warner & Swasey

WARNER & SWASEY Machine Tools *Cleveland*

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

STEEL

WHERE GIANT PRESSES PLUS HOLD WHEEL TOLERANCE TO

Conforming to strict standards of excellence is everyday procedure at Sterling. It is one of many features of Sterling's New Research and Development Program that is resulting in superior, long-lived grinding wheels to do your jobs better and much faster.

Production-minded engineers are ready to apply all the functions of our unusual research technique to making, whenever necessary, special wheels for your jobs----building them to snap up your production at a real, profit-building pace! This is being done in large and small industries everywhere....and can be accomplished in yours! We'll provide quick delivery, too!

Try Sterling's "Wheels of Industry" made to a new plan, backed up by the most up-to-date creative and manufacturing program available anywhere. Upon request, we'll explain its many features. You'll like them!

Sterling Research and Development In Action

FIRST STEP When necessary, the Sterling engineer will recommend a new wheel, built to your specific job demands.

SECOND STEP . . . He will examine your grinding set-up and suggest necessary changes He may ask you for a sample of the job's alloy.

THIRD STEP In our laboratory, your alloy sample will undergo many tests. Your resulting wheel will be approved by five technicians.

FOURTH STEP Your special wheel is certain to do a quicker, more efficient job - - the natural result of Sterling's careful planning.

THE STERLING GRINDING WHEEL DIVISION
of
THE CLEVELAND QUARRIES CO.
TIFFIN, OHIO

Since 1885, Manufacturers of "The Wheels of Industry"

Branches: Boston, Chicago, Cleveland, Detroit, Los Angeles, Philadelphia, New York. Distributors In All Cities.

ING

TECHNICAL SKILL
MERE THOUSANDTHS

These Sterling folders are now available. Send for yours today.

AN EXAMPLE of STERLING'S DEVELOPMENT TECHNIQUE

JUST the right bond and grain combination, subjected to tons of pressure, comes out as a structurally perfect wheel, accurate to thousandths of an inch, and ready for further processing.

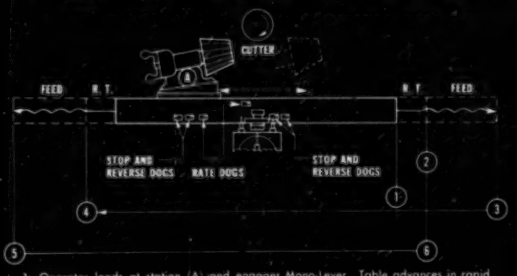
Photo and job data courtesy Brandt Automatic Cashier Company, Watertown, Wisconsin

Here's a picture of modern profit-making in action! The part: A cast aluminum coin-machine part. The job: Simultaneously mill slots and flats between slots. The machine: A Kearney & Trecker Model 2H Plain Automatic Cycle Milling Machine with *Mono-Lever* Table Control. Results: Over 96% increased production on this part — *plus* more uniform, more accurate results — *plus* reduced operator fatigue. Average tolerance on slots — .0003", flats — .001". Cutters: HSS. See sketch for details on how new *Mono-Lever* Control and Automatic Table Cycle makes these big savings possible.

Looking for savings? SEE MACHINE INCREASED

HOW JOB IS DONE

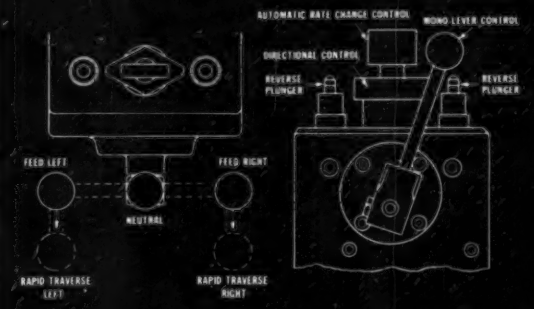
USING AUTOMATIC TABLE CYCLE AND MONO-LEVER CONTROL



1. Operator loads at station (A) and engages Mono-Lever. Table advances in rapid traverse to point of cut.
2. At point of cut, pre-set rate dog changes rapid traverse to feed for conventional cut. Table remains in feed for short distance after cut to allow operator to index workpiece.
3. Stop and reverse dogs reverse table in rapid traverse to point of cut.
4. At point of cut, pre-set rate dog changes rapid traverse to feed for climb cut. Table remains in feed for short distance after cut to allow operator to index workpiece.
5. Stop and reverse dogs reverse table in rapid traverse to point of cut.
6. Cycle repeats from (2) until all slots and flats are milled.

HOW IT WORKS

AUTOMATIC TABLE CYCLE and MONO-LEVER CONTROL UNIT



NOTE SIMPLE STEP-BY-STEP OPERATION sequence on this job. Table cycle is pre-set to fit operator's required indexing time. Table feed screw with adjustable nut eliminates backlash so climb and conventional cuts are taken with equal ease.

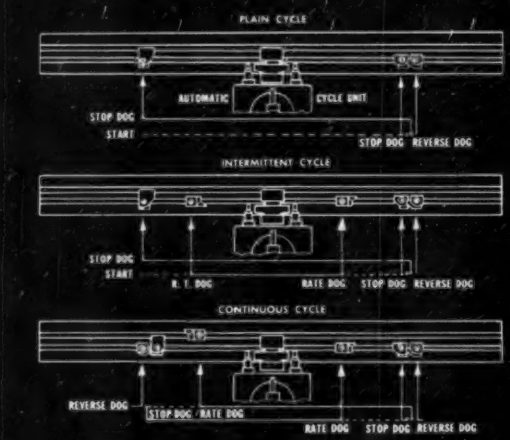
THINK OF IT! Now you can have all the advantages of this great cost-cutting feature plus the all-around versatility of general purpose, knee-type machines . . . faster, easier control for greater production with less operator fatigue.

THE plain facts of this job show you in practical terms what Kearney & Trecker research and development gives you — *greater production at lower cost!*

The machine shown is one of a great new, complete line of Kearney & Trecker knee-type milling machines with Automatic Table Cycle and *Mono-Lever* Control. They give you profit-making advantages never before available on knee-type machines. They combine the versatility and working range of knee-types with the automatic, high production of bed types. Hand control of the table is done by simple movement of ONE LEVER — substantially reducing idle cutter time and operator fatigue.

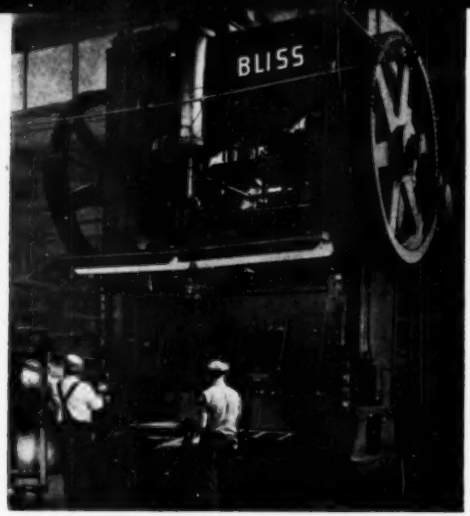
EQUALLY important to you is the opportunity for proper machine selection. You neither *over buy* nor *under-buy*, but you buy *right* when you choose from the 56 machines in this new Kearney & Trecker line. For startling facts about these machines and their application to your milling work, consult a Kearney & Trecker Sales Representative today. He's schooled in the "know-how" and he's at your service. For detailed information, contact him or write us direct. Ask for Catalog No. AC-10A. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

TYPICAL CYCLES YOU CAN USE



THREE DIFFERENT TYPICAL CYCLES to accommodate various job set-ups. Using the completely automatic cycle feature effects substantial savings for lots of 10 or more pieces. Cycle can be set for loading and unloading time — and can be reversed in feed or rapid traverse.

HOW ONE NEW MILLING PRODUCTION OVER 96%



Three sets of dies in this 400-ton Bliss press simultaneously trim two corners, flange front, trim two ends and pierce and redraw grate opening of main top of oil stove. Triple die set-up performs more than 1000 operations every hour.

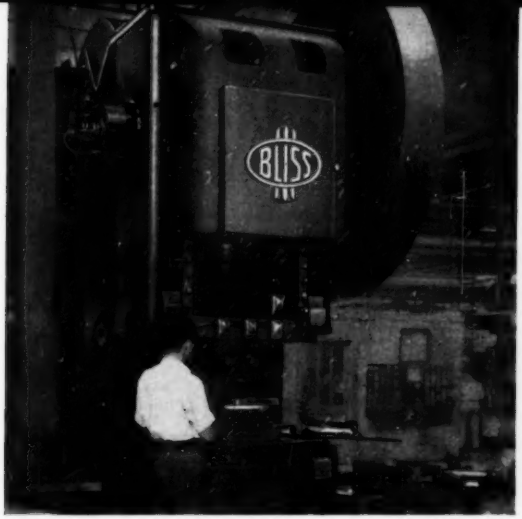
NEW FLORENCE STOVE

No. 30 Bliss Arch Press piercing and blanking a variety of stove parts. Arch presses provide the rigidity of a straight side press and a proportionately larger bed area...are ideal for blanking operations on large area sheets of light gauge metal.

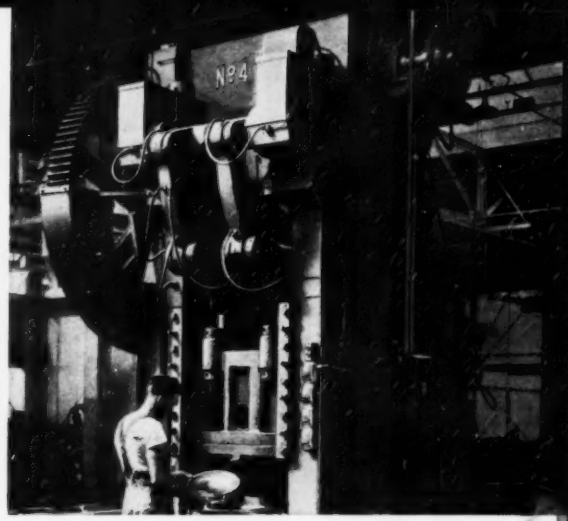
All sixty-one presses at the new Lewisburg, Tennessee, plant of Florence Stove Company are Bliss-Built. Why? Because past-performance analysis of Bliss and several other make presses in the Company's Gardner, Masssachusetts, plant was yardstick enough for Florence to know the advantages of an All-Bliss-equipped plant.

MARQUETTE · BLISS · CONSOLIDATED · TOLEDO · BLISS BUILT

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD



Reservoirs for oil stoves are drawn in a Bliss No. 29 open back inclinable press equipped with Bliss die cushion. Material is 20 gauge steel .035. Main top of stove is drawn in a Bliss Double Crank Press—largest in the Florence Lewisburg plant.



One of several new Bliss toggle presses at the Florence plant forming a heater tank top. This No. 4 press is equipped with a die cushion in the bed which is used alternately for an additional forming operation or as a knockout, depending on the particular job.

PLANT GOES 100% BLISS

"Bliss Equipment gives us up to 50% more production"

—FLORENCE OPERATIONS HEAD

Here's how G. B. Colburn, vice president in charge of Florence Stove's Lewisburg operations, sums it up. "Experience at our Gardner plant, which was 60% Bliss-equipped, proved that Bliss presses gave us higher productivity per press with less 'down-time' for maintenance and repair. Our press runs are short, die-changeover is frequent with about 1100 dies in steady use, and the presses are worked hard. Bliss equipment gives us up to 50% more production. Many of our older Bliss presses are still being used for the operations for which they were originally bought—thanks to the assistance of Bliss engineers in selecting the right press for the job."

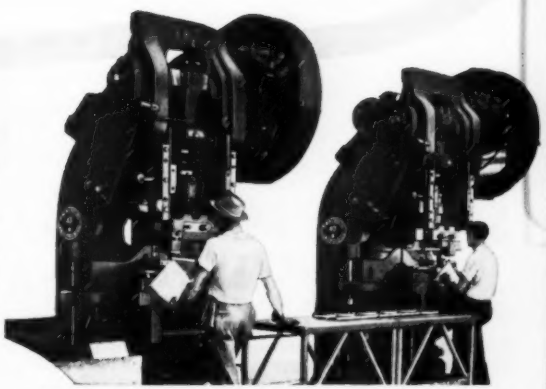
Add Florence Stove to the universal list of press users whose stamping lines are predominantly Bliss...who know that BLISS on a press is more than a name—it's a guarantee. You'll get the same dividends by putting your pressed metal problem up to Bliss.

See our catalog in SWEETS—or send for Bulletin 35B

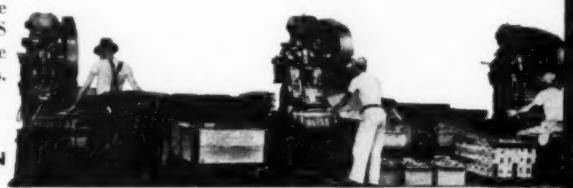
E. W. BLISS COMPANY, DETROIT 2, MICHIGAN

Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Cleveland, Salem, Ohio; Hastings, Mich.; Englewood, N. J.; Derby, England; St. Ouen sur Seine, France.



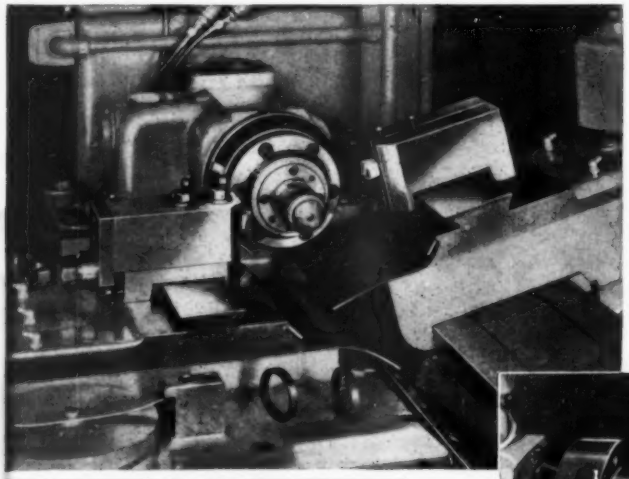
Bliss Adjustable Bed Presses trim front and rear corners on lift top covers—also perform many forming operations on other stove parts. Screw adjustable table gives wide range of shutheight.



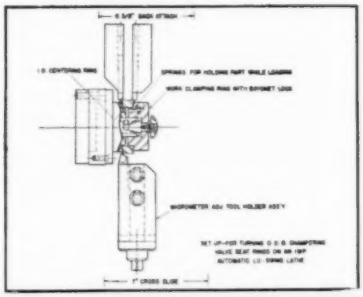
Three of several dozen Bliss inclinable presses shown blanking a manifold clip and leg plate for oil stove.

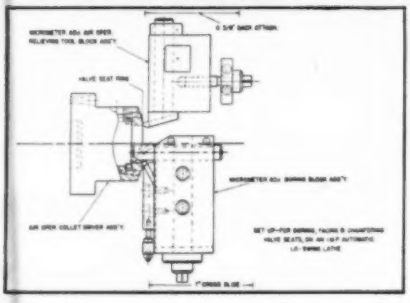
MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE *Lo-swing* PEOPLE"** SENECA FALLS, NEW YORK

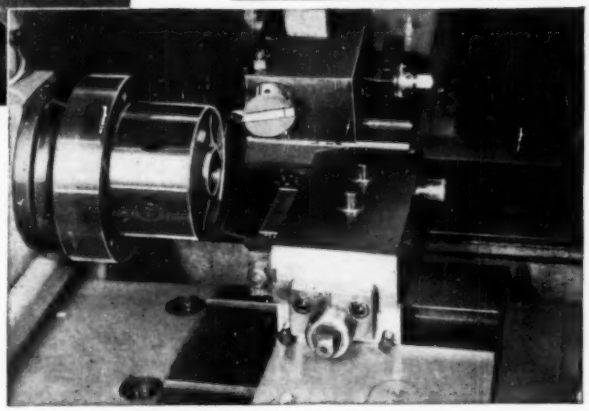


First operation machine ◀ (left) and tooling (right) ▶





Second operation machine (right) ▶ and tooling ◀ (left)



Lo-swing IMPS TURN, BORE, FACE AND CHAMFER VALVE SEATS WITH SPEED AND ACCURACY

Problem: To provide automatic cycle machines for two operations on Valve Seats machined from very hard material. Specifications call for fine finish and accuracy, and ability to change over from one size valve seat to another.

Solution: The IMP Automatic *Lo-swing* Lathes selected for this job were equipped with tooling clearly shown in the illustrations and line drawings. The parts are delivered to the first operation machines, rough ground on their two parallel faces. The parts are mounted on an air operated arbor, equipped with a bayonet lock for quick action, and clamped on the ground faces. The automatic cycle is then started and the part is turned and chamfered on the O. D. The second operation machines, are fitted with an air operated collet chuck which clamps the part true with the O. D. The automatic cycle is started and tools on the front carriage bore and chamfer the I. D., while a tool mounted in a relieving type tool block on the back attachment finishes the face true with the O. D. and the bore. One operator runs two machines, each of which have the same cycle time.

Consult our Engineering Department on your turning problems.

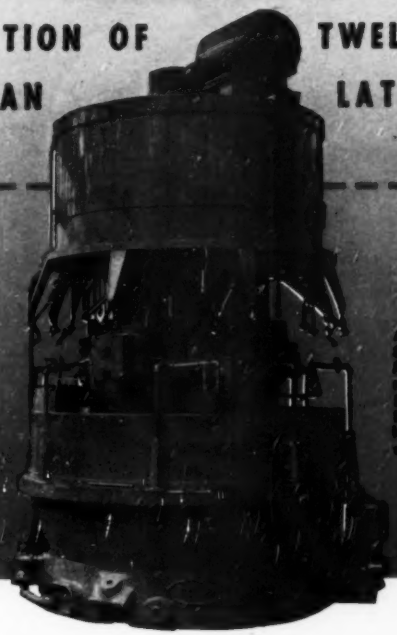
SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

THIS ONE MACHINE

EQUALS THE PRODUCTION OF TWELVE TO FOURTEEN CAPSTAN LATHES

From Coventry, England, comes this enthusiastic report of the Standard Motor Co., Ltd., on the BULLARD Type D Mult-Au-Matic.



A BULLARD Type D 8-Spindle Mult-Au-Matic used in the up-to-date plant of the Standard Motor Co., Ltd., Coventry, England. Note the compact, space-saving design.

The work. A cast differential gear case, before machining.

The same casting after completing one cycle (through 7 work stations) on the BULLARD machine. Arrows indicate the 12 machined faces . . . . Piece time: 2 minutes!

According to a leading British automobile manufacturer, the BULLARD 8-spindle Mult-Au-Matic is an excellent example of modernization of production machinery . . . with particular emphasis on its ability to perform 12 machining operations — entirely automatically — in 2 minutes' piece time! Case histories show why BULLARD Mult-Au-Matics are internationally recognized as outstanding among multi-spindle manufacturing equipment . . . key factors in the present world-wide effort to cut the time and costs of production.

BULLARD Mult-Au-Matics are rugged versatile machines designed to cut manufacturing cost on a wide variety of jobs. These are not exclusively high production machines since case histories show reduced manufacturing costs on short runs of work. Individual speeds and feeds at each station provide correct cutting conditions for various diameters, operations and a wide variety of cutting tools. Study the manufacturing economics of the Mult-Au-Matic Method as applied to your work. *The Bullard Company, Bridgeport 2, Connecticut.*

Send prints of your jobs for engineering estimates. Refer to ad MD 122

Close-ups of 2 of the 7 fully automatic work stations, showing several tools cutting simultaneously.

MARVEL Saws Speed-Up Deliveries

TUBE DISTRIBUTORS CO., IN

Offices and Warehouse: 150 Green Street, Brooklyn 22, N.Y. - Phone Evergreen 9-600

May 6, 1947

Armstrong-Blum Mfg. Co.
5700 West Bloomingdale Avenue
Chicago 39, Illinois

Gentlemen:

In a short time we expect to place an order with you for another No. 9A Marvel Automatic Hack Saw. This is in addition to the two machines we now have.

Our present Marvel Automatic Hack Saws are giving us very satisfactory service, enabling us to speed cutting of mechanical and boiler tubes to our customers' required lengths at a minimum of cost, both for labor and blades.

Your service and attention to our requirements have been very satisfactory.

Sincerely,

TUBE DISTRIBUTORS CO., INC.

A F Lewis

AFL:CB

Superintendent

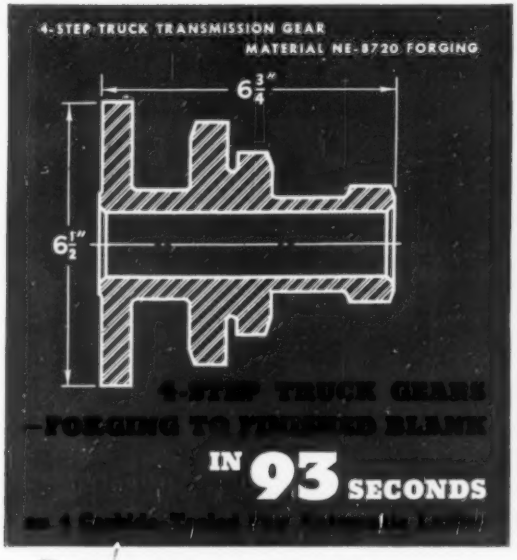
Steel warehouses and stockrooms deliver cut-off lengths in any quantity FASTER—BETTER—CHEAPER when equipped with MARVEL 6A and 9A Automatic Hack Saws. Far faster, floor to floor, than any other hack saws, they save valuable machine hours by reducing cutting-off time to a fraction—save other machining hours by producing accurately cut pieces of exact length.

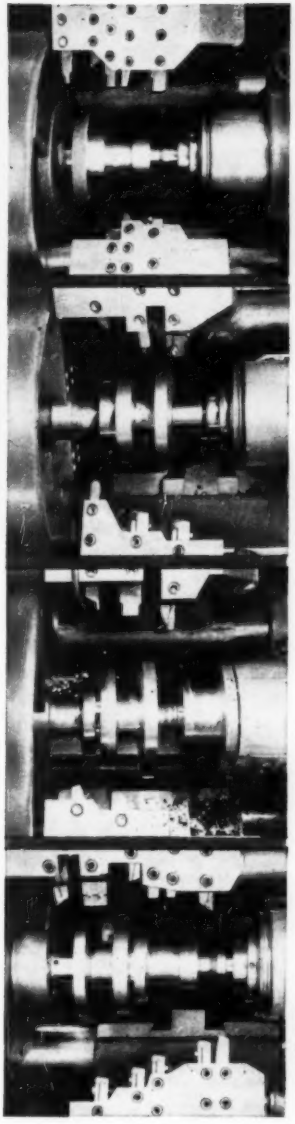
There is a MARVEL Saw for every need—in every capacity range and price class. Your local MARVEL Sawing Engineer will gladly study your metal sawing problems and requirements and make recommendations as to methods and equipment.

Metal Cutting
MARVEL SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. COMPANY
"The Hack Saw People"
5700 BLOOMINGDALE AVENUE CHICAGO 39, U. S. A.

DO YOU COMPETE AGAINST PRODUCTION LIKE THIS ?





24 SECONDS 1st operation

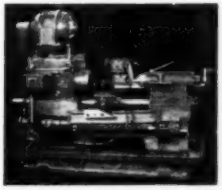
28 SECONDS 2nd operation

18 SECONDS 3rd operation

23 SECONDS 4th operation

This 4-operation gear job is a striking example of production turning on the Fay Automatic Lathe. Every tool has either a brazed or an insert-type carbide tip. Approximately 68 HP is transmitted during the first operation! Surface speeds range from 450 to 660 FPM. The blanks are completely turned, faced, formed and grooved, with every important surface held true and concentric . . . Moreover, these 4 machines are doing the work formerly done by 17!

Why not write us for more details? Let us show you why it's cheaper to own a Fay than to compete against one!



Our new 16" Fay Catalog contains many other examples of high production turning. Write to Dept. 710F for your copy.

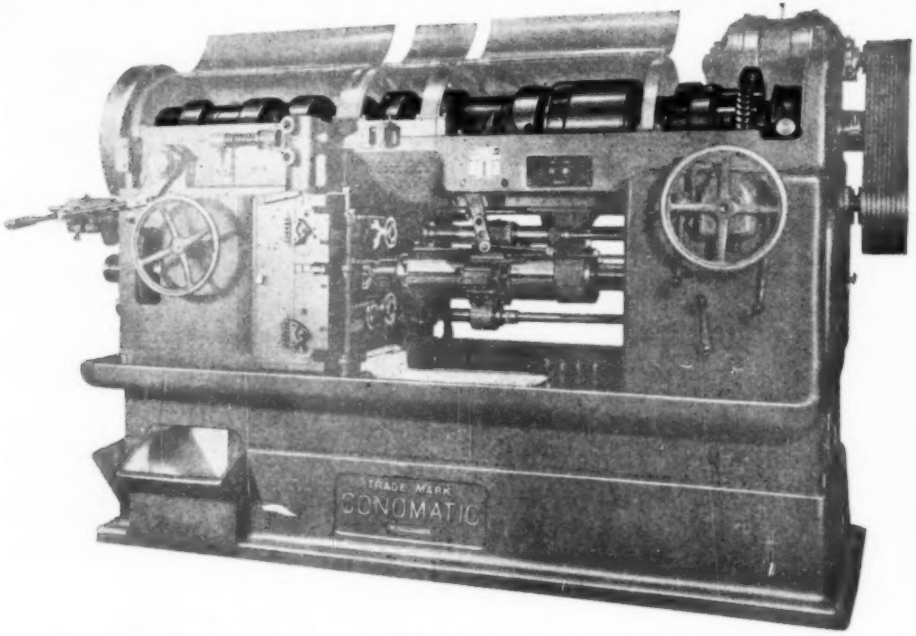
DESIGNED To lower every turning cost. ***BUILT*** For maximum production with either carbide or high speed steel tools. ***POWERED*** To produce more chips per tool, more pieces per hour, more profit per job . . . than any automatic lathe of comparable range.

Fay Lathe Division

J&L JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

Everything Under CONTROL



The CONE Frame Design centralizes cam control outside of the tooling area, clear of chips. All cams, *visibly* accessible, have a stabilized high-point and are jig drilled. Change is easily made by removing a few screws.

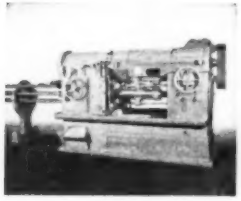
There is no satisfactory substitute to date for a good cam system, but the relative importance of its features should not be confused. Those that control and transfer smooth, positive power, to tool slides and other machine units, are of major importance. A feature of cam change facility, though useful, is less important.

Long runs, or "grouped" short runs, require minimum cam change, and the time for changing cams on any "automatic" is only a fraction of the total required for complete job change-over. A mere turn of a dial changes the working stroke of any slide on the 1" CONOMATIC, but this facility is of minor importance compared to the major advantages of the machine's CONE Cam System.

Any good investment has certain qualifications that prove it profitable. The wise investor and smart banker have some sort of measuring stick to analyze every investment they make. Why not use a chart to guide your purchases of Automatic Bar Machines? If you are already using a chart, perhaps you would like to compare it with the one that we have prepared. Write to us for a copy or ask your Cone representative.

	MACHINE #1*	MACHINE #2	MACHINE #3	MACHINE #4	MACHINE #5
WORK & TOOL CAPACITY	✓				
WORK & TOOL SUPPORT	✓				
WORK & TOOL MAINTENANCE	✓				

*CONOMATIC



A comparison with ALL Automatics
will lead you to

Conomatic}

#5

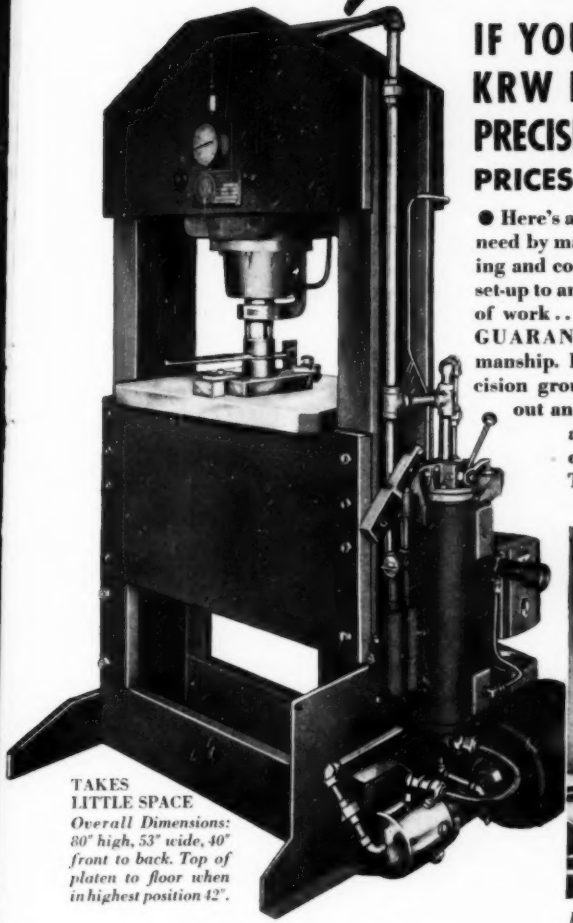
CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

There's a PLACE *for this* PRESS *in Your* PLANT

IF YOU WORK WITH METAL, THIS NEW KRW FORGING AND FORMING PRESS IS PRECISION-BUILT FOR LONG OR SHORT RUNS

PRICES* RANGE FROM ONLY $1850 TO $1910!

● Here's a brand new dual purpose Hydraulic Press that fills a long felt need by many plants. This new 75-ton press can be used on many forming and cold forging or pressing operations. It is easily shifted from one set-up to another; can be used with inexpensive dies to do a wide variety of work . . . relieving heavier equipment for other work. The press is GUARANTEED for ONE YEAR against defects in material or workmanship. Here are some of its features: adjustable bed, platen is precision ground. Equipped with 2-speed built-in hand pump for die try out and delicate pressing. Mechanite Cylinders precision machined and honed to mirror finish. Guided ram to prevent ram swiveling. Get the facts about this latest KRW press development. There's a place in your plant where it can save you money.



TAKES LITTLE SPACE
Overall Dimensions: 80" high, 53" wide, 40" front to back. Top of platen to floor when in highest position 42".

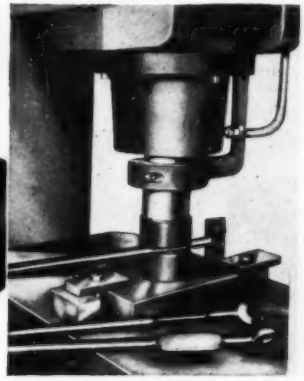


Illustration shows the press being used to cold form an automotive valve lifter.

BRIEF "SPECS"

Standard Model, Series 3700-F, 75-tons.

6" ID Cylinder, 7¼" stroke.

Platen 30"x18"x2", adjustable in 4" steps.

Daylight 6" Min. to 18" Max.

Frame Heavy welded steel.

11" stroke cylinder available in air return or double acting types.

Ram Travel Speed varies from 1" per 3.5 seconds to 1" per 2.6 seconds depending upon capacity of hydraulic equipment selected.

Delivery: Standard models one week.

* Depending upon capacity and size of hydraulic equipment and motor required. F. O. B. Factory.

MAIL COUPON TODAY FOR ALL THE FACTS

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

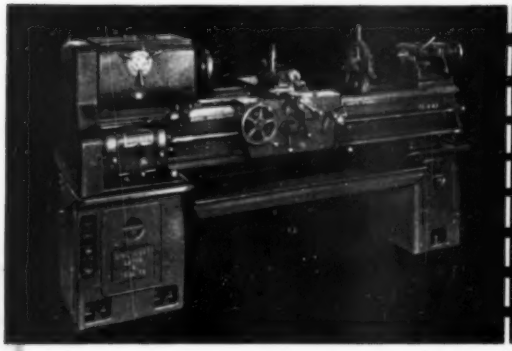
Please quote me prices and information on your new 75-ton Series 3700-F Press.

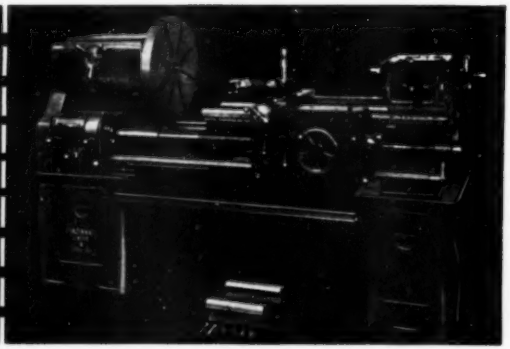
Name .....

Address .....

City and Zone ..... *State* .....

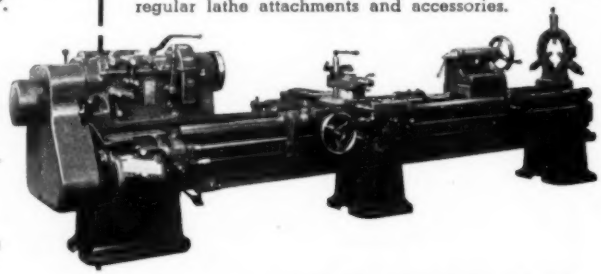
GET MORE... PAY LESS



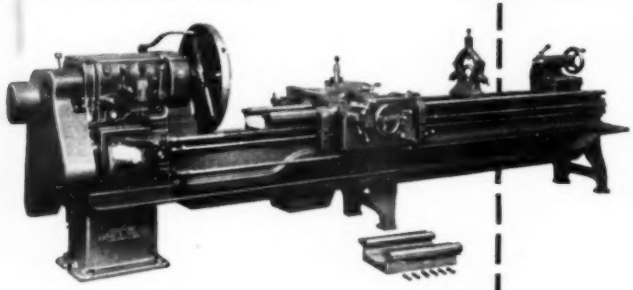


Lightweight Champ: The new Tray-Top line of light duty geared head engine lathes (10", 12½", 15", and 18" swing sizes) offers many "high price" lathe features at truly low cost: 12 spindle speeds, selected by color-coded dial; 48 thread and feed changes; exceptionally large spindles; anti-friction bearings, double-walled apron; totally enclosed quick change gear box; many others. Distance between centers from 18" to 60".

All This – And Gap, Too: 15" and 18" Tray-Tops furnished with gap, give you 22" and 25" swings over gap. Carriage has short wings on headstock end for maximum approach of tool; wings on tailstock are extended for maximum rigidity and adequate bearing surface on bed. Like regular Tray-Top, distance between centers from 18" to 60", in increments of 6". All furnished with regular lathe attachments and accessories.



Middleweight Champ: In the medium duty class, the Standard line (14", 16", 18" 20", 22", and 24" nominal swings) assures you real all-around utility with exceptionally low initial investment; quickly pays for itself by efficient handling of practically all your turning, boring, and threading operations. 12 spindle speeds; 32 thread and feed changes; distance between centers from 30" to 240".



Gaps In All 6 Sizes – Increase Capacity: With swings over gap from 24½" to 38½", Standard Fixed Gap Bed Cintilathes give you oversize work capacity where cost of heavy lathe is not justified. Versatility and economy are balanced to your requirements.

WRITE FOR BULLETINS: *T-100 on Tray-Tops; T-101 on Tray-Tops with Gap; S-100 on Standards; S-101 on Standards with Gap.*

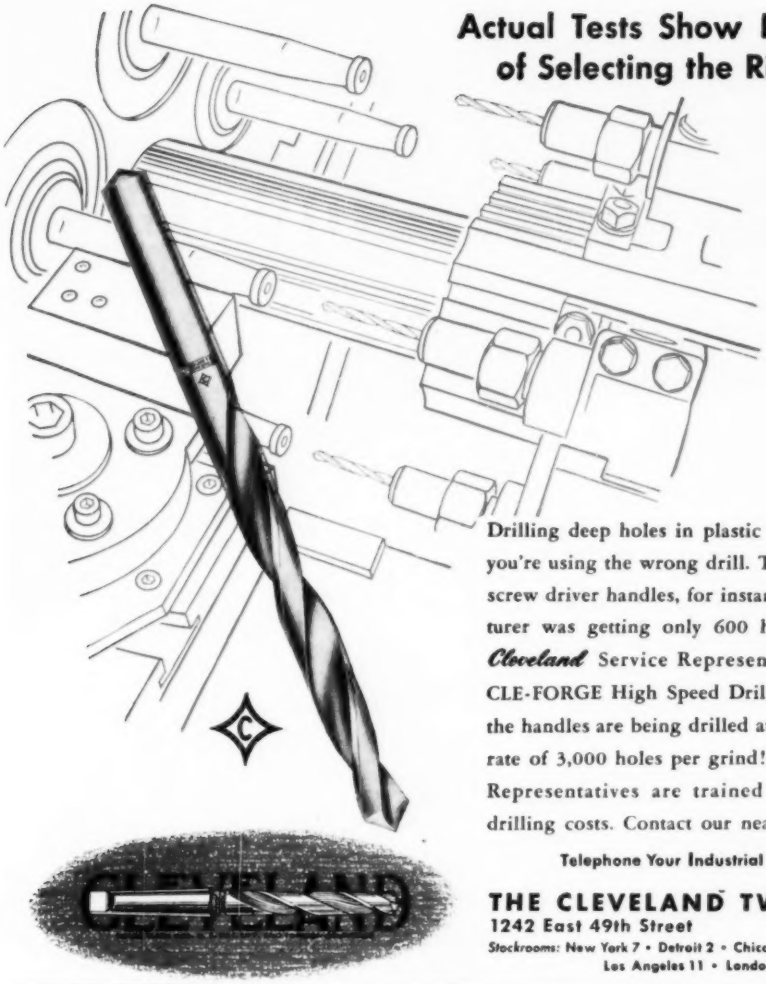
the best buy in its class

cintilathe

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO

Here's a Tip
On DRILLING PLASTICS

Actual Tests Show Importance of Selecting the Right Drill

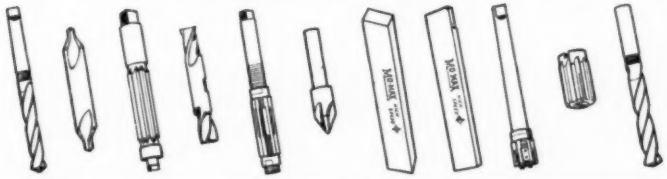


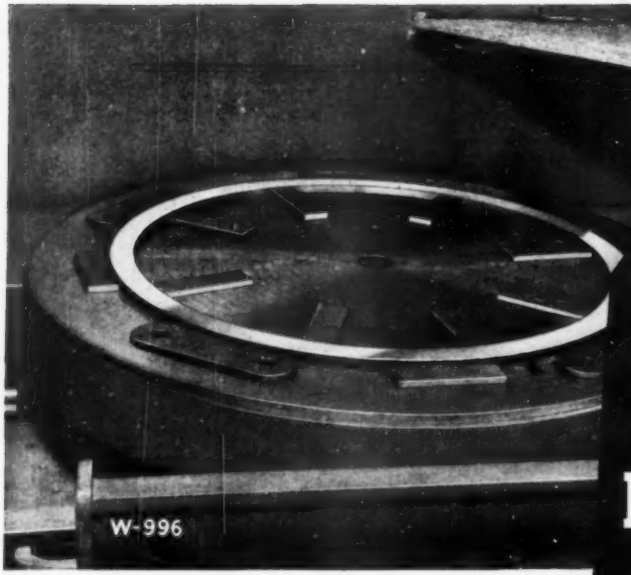
Drilling deep holes in plastic can be a problem . . . if you're using the wrong drill. Take these nitro-cellulose screw driver handles, for instance. An eastern manufacturer was getting only 600 holes per grind, until a *Cleveland* Service Representative ran a test on the CLE-FORGE High Speed Drill shown at the left. Now the handles are being drilled at the almost unbelievable rate of 3,000 holes per grind! *Cleveland* Service Representatives are trained to help you cut your drilling costs. Contact our nearest Stockroom, or . . .

Telephone Your Industrial Supply Distributor

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street **Cleveland 14, Ohio**
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5
Los Angeles 11 • London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER CLEVELAND TOOLS





A SAVING OF $8.00 PER PIECE

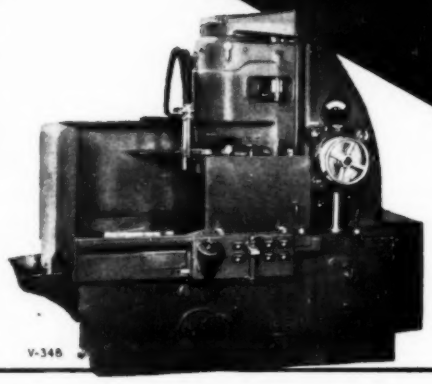
WHEN THEY.... PUT IT ON THE BLANCHARD

Yes, this special alloy stainless steel ring 28" x 2½" x 9/16" was finish ground on the No. 18 Blanchard Surface Grinder with 36" chuck at a saving of $8.00 per piece over previous method.

Machining this alloy stainless steel ring by the previous difficult method cost $9.00 per piece. The combination of Blanchard Grinder, Blanchard Engineering, and wheel selection reduced production cost to $1.00 per ring. One side was ground removing .070" of metal to close dimension and flatness tolerances.

Here again is proof positive that the most profitable words in flat surface machining are "Put it on the Blanchard."

Are you machining your flat surface the most economical way? Talk it over with Blanchard.



Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

Send for your free copy of the first edition of "Art of Blanchard Surface Grinding." This newest of Blanchard books shows you how to get best production results with Blanchard Surface Grinders.

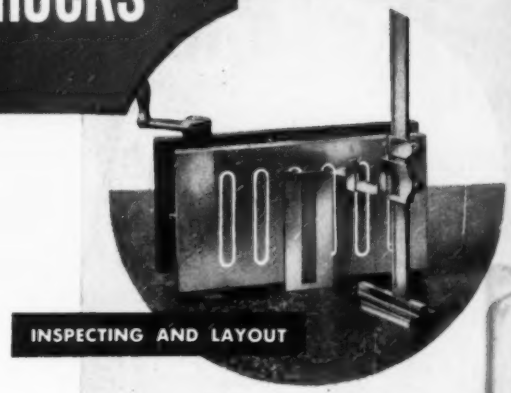
BLANCHARD

The BLANCHARD MACHINE COMPANY

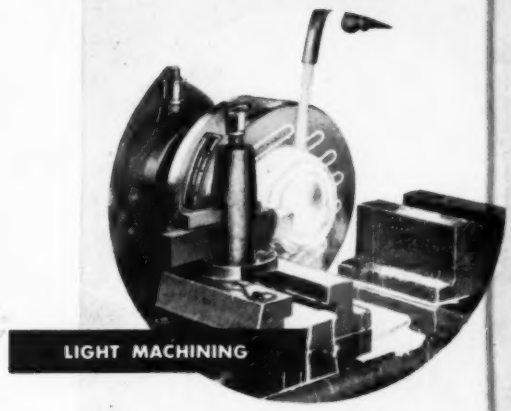
64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

Save Time on Set-ups with these
PERMANENT MAGNET CHUCKS

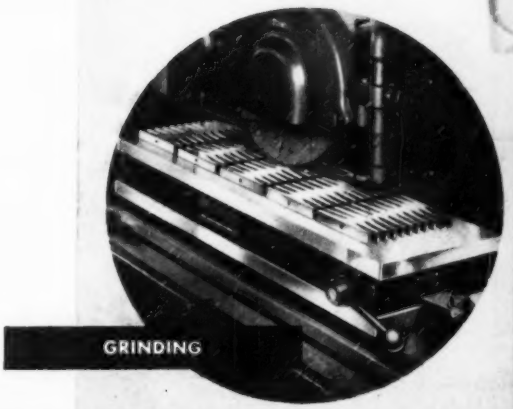
No Jigs . . . No Fixtures . . .
No Electrical Connections . . .



INSPECTING AND LAYOUT



LIGHT MACHINING



GRINDING

HERE'S A WAY to simplify and economize on many jobs in your shop . . . with the help of these powerful permanent magnet chucks. By using them, you can avoid a lot of time-consuming extra work and do a better job too.

These portable chucks require no electric current, no wires, no clamps, vises, jigs or fixtures. A simple turn of a lever holds work securely. Another turn releases work instantly. Holding power can be varied for work positioning. They will hold work as long as desired without damage because they do not heat . . . and they can be used for wet or dry grinding. Magnets last indefinitely.

Get all the advantages of these unique production aids.

WIDE RANGE OF TYPES AND SIZES

These patented Brown & Sharpe Permanent Magnet Chucks are available as follows:

- **RECTANGULAR MODELS**—8 sizes, up to 12⅛" x 36"
- **ROTARY MODELS**—3 sizes, diameters—5", 7", 9"

Also available . . . auxiliary top plates, magnetic chuck parallels, magnetic blocks with plain or V face and other useful holding aids.

For sale only in the United States of America and its Territories. Write for Catalog describing operating principles and specifications. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

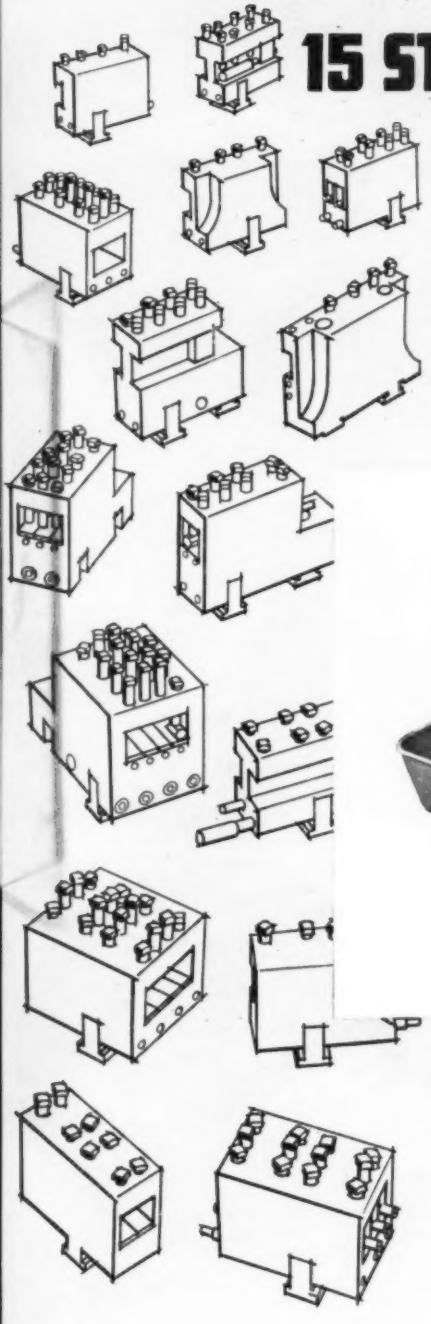
UNIQUE FEATURES

No Wires • No Heating • No Operating Costs
No Installation Costs • Portable • Adaptable
Safe • Simple to use • Long Life.

We urge buying through the Distributor

BROWN & SHARPE

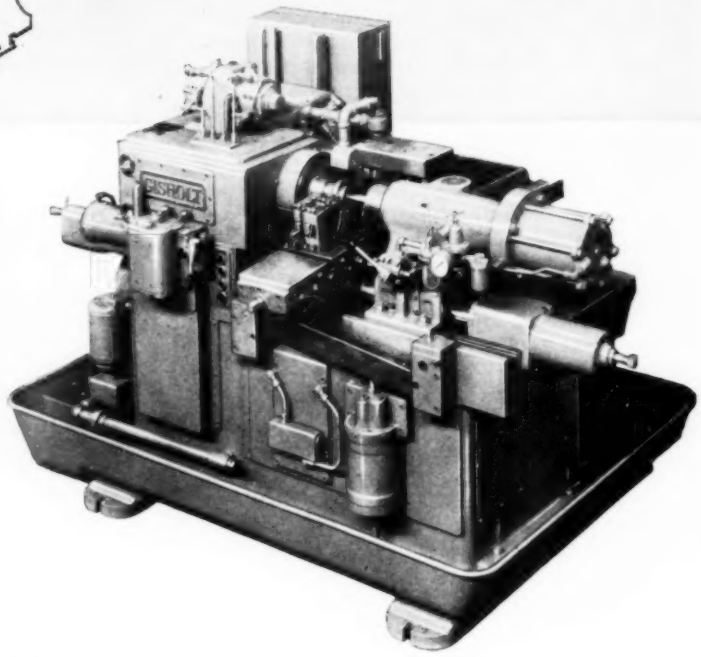
GISHOLT No.12 HYDRAULIC AUTOMATIC LATHE



15 STANDARD TOOL BLOCKS

cut down tooling costs.

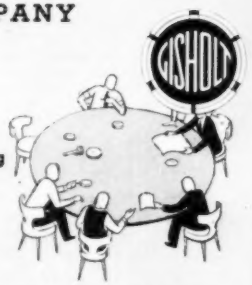
They're handy for small lot work—available from stock.



GISHOLT MACHINE COMPANY

Madison 10, Wisconsin

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



TURRET LATHES · AUTOMATIC LATHES · SUPERFINISHERS · BALANCERS · SPECIAL MACHINES

Cuts Your Down Time

GETS YOU ROLLING AGAIN SOONER!

Example: Whether on Motors Under 200 hp, as Pictured, or as Big as the 2700 hp Motor that was Rewound and Running Again in Six Days for E. I. Dupont Co. — Service Stands Back of Charleston Electric Supply Co., Charleston, W. Va.

CHARLESTON ELECTRIC is a *typical* Allis-Chalmers Certified Service shop . . . the kind that is located in every major industrial center.

Yes, *you* can cut lost production time to the bone . . . get fast, expert service on motors, transformers and control by calling the authorized A-C Certified Service shop in your area whenever you need help.

A-C Certified Service Shops are hand picked from the best independent shops in industrial areas. Each meets exacting Allis-Chalmers standards for experience, highly skilled workmen, modern equipment and reputation for square dealing. Each uses nothing but factory approved methods and parts.

Ask Your A-C Dealer or Office—Most industrial areas are now served by A-C Certified Service Shops. For expert service — or for *new* motors from ½ to 25,000 hp — see your A-C Authorized Dealer or District Office. A 2615

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and District Offices throughout the country.

MOTORS — ½ to 25,000 HP and up. Matching Allis-Chalmers Control.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

ALLIS-CHALMERS

COLD SHOULDER!

Specifications for aircraft hydraulic control valves had this designer roped and tied. Make it small! . . . Make it light! . . . Make it strong! . . . Make it cheap! He knew magnesium filled the bill for lightness and strength . . . but gave it the cold shoulder. He took his problems to Aluminum Company of America, light metal headquarters, and learned surprising things. Simple shop practices make handling magnesium no problem.* He discovered, too, that every month fellow manufacturers are using over a million pounds of magnesium.

He found that immediately-available magnesium forgings were plenty strong, light and small enough to beat the specifications. Cheap to finish, too, for magnesium machines best of all commercial metals. He got books on designing and fabricating magnesium, plus all the technical aid he needed. He says his M. E. Degree stands for Magnesium Enthusiast, too.

*No change in insurance rates.

These two, free books on magnesium and our broad technical experience can help your products, too. Write Aluminum Company of America, sales agent for American Magnesium Products, 2107 Gulf Building, Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

KEEP YOUR MACHINES RUNNING...

DON'T STOP SPINDLES TO CHANGE TOOLS

MODERN-MAGIC CHUCK
AND COLLET EQUIPMENT

Increase your production through elimination of spindle stoppage for tool change. With Modern-Magic Chuck and Collet equipment, tools are quickly and easily changed as the spindle revolves at operating speed. Simple, advanced design makes Modern-Magic Chucks and Collets practically trouble-free. Sturdy, fool-proof construction insures longer accurate service. Your copy of Bulletin M-103 giving full information will be sent upon request. Today?

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

MODERN TOOL WORKS

DIVISION OF

CONSOLIDATED MACHINE TOOL CORPORATION

ROCHESTER 10, NEW YORK

For a wide diversity of sensitive drilling operations

FOSDICK *Sensitive* RADIALS

The Fosdick Sensitive Radial illustrated is operating in the plant of the Reliable Electric Co. of Chicago, Illinois. This is only one of the many types of plants where Fosdick Sensitive Radials are meeting varied job requirements.

● Regardless of what type of an industrial plant uses a FOSDICK Sensitive RADIAL and whether it is working on a production job or "quickie" the general all-around utility of the machine on sensitive operations makes it a valuable asset to any shop.

Designed and built along the general lines of a Radial except that it has the arm at a fixed height plus an adjustable table which slides up and down the column, the FOSDICK Sensitive RADIAL is meeting a steadily increasing number of job requirements.

The nine speeds and four feeds—the standard base construction—the adjustable table and arm at fixed height, both of which swing in an arc of 360°, are construction features which add immeasurably to the utility of the machine.

Full details of this machine are available in the Fosdick Sensitive Radial Bulletin S.R.A.

Write for a copy today.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

146-Tooth Chamfered Ring Gears in 29 Seconds

Using

BARBER-COLMAN SINGLE-POSITION HOBS

Hobbing these flywheel ring gears not only puts gear tooth chamfering on a production basis with other forms of gear cutting but also proves highly economical as far as tool life is concerned.

Since Barber-Colman *"Multi-thread"* Gear Chamfering Hobs have been used on this job, a consistently high rate of output has been maintained. A complete 146-tooth gear is chamfered every 29 seconds floor-to-floor. Not only has production increased, *but tool life has jumped from 30 to 160 pieces per hob sharpening.*

JOB FACTS

Operation—Chamfer one side of 146-tooth ring gear, 14" dia x ½" face, 10 pitch
Material—SAE 1050A
Hobs—Barber-Colman Chamfering Hobs, 5" dia., 3 threads
Fl-to-Fl—29 seconds per gear
Tool Life—160 pieces per sharpening
No. Sharp.—75; .005" per sharpening

Special Barber-Colman hobs, correctly designed for your job, can save many hours of production time and reduce tool costs to a minimum. Ask your Barber-Colman representative for production estimates on your jobs.

Barber-Colman Company

GENERAL OFFICES AND PLANT, 3113 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

GET THIS FREE BOOK

A complete file of case histories on special and high production hobbing jobs. Ask for file No. 3113.

Here's what they say about P-K

SIZE-MARKED Socket Head Cap Screws

TOOL CRIB BOSSES say sorting is made easier, speeded up . . . just a quick glance at the head of any P-K Cap Screw reveals its size.

ASSEMBLY LINE OPERATORS report valuable time saved because sizes are always issued correctly . . . no time out to find out — job moves faster.

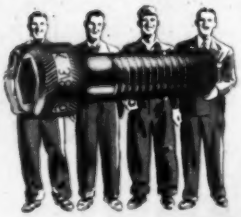
NEW HELP agree sizes can be learned faster . . . also, the Size-Mark protects them from errors.

SALES MANAGERS, TOO, recognize the Size-Mark as an added sales-feature . . . a definite aid to customers' service men in reassembly.

Plus . . . GEAR GRIP* . . . it simplifies work!

Gear Grip on Size-Marked Socket Head Cap Screws is a further aid to fast work . . . prevents slipping even when fingers are oily.

ONLY PARKER-KALON OFFERS BOTH Size-Mark and Gear Grip in Socket Head Cap Screws. See how they save time and trouble all along the line.



SEND FOR SAMPLES. Discover for yourself why P-K Socket Screws can put your product out front, assembly-wise and sales-wise. Parker-Kalon Corporation, 200 Varick Street, New York 14, New York.

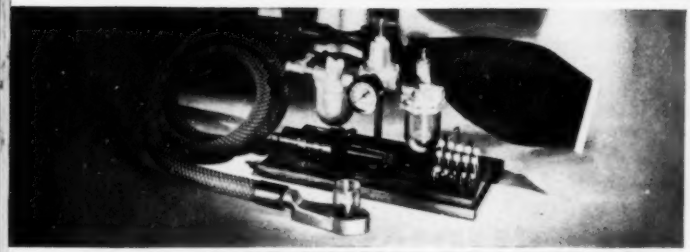
P-K Socket Screws are available for prompt delivery in every industrial area.

SEND FOR STOCK LIST NOW

PARKER-KALON *COLD-FORGED* SOCKET SCREWS

*U. S. DESIGN PAT. NO. 128,419 SOLD ONLY THROUGH ACCREDITED DISTRIBUTORS

COMPLETE SYSTEM INCLUDES DUST ELIMINATION



JIG GRINDING
with the
Vulcanaire

WHEN Jig Grinding is required you can have it quickly and economically with the Vulcanaire. Place in the spindle of your Jig Borer (or Mill).

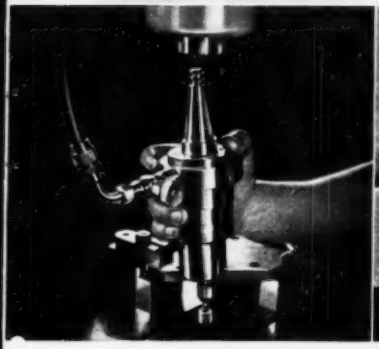
AND YOU CAN . . locate—finish grind holes in hardened steel to "tenths" at controlled speeds up to 65,000 R.P.M. . . grind dowel holes—square with a ground base . . move location of holes in hardened steel blocks . . grind interchangeable holes in hardened sections . . grind .032 to ⅛" holes with diamond impregnated laps . . grind contours and relief with tungsten carbide burrs . . grind radii in die sections . . grind contours in gages . . jig grind large and awkwardly shaped components . . eliminate jig bushings in tools where close spacing is essential.

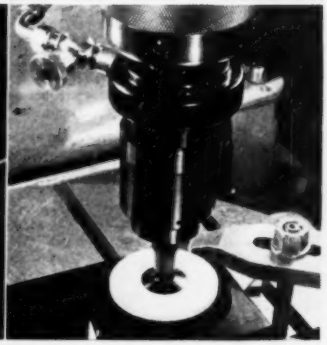
RESULTS! Jig ground requirements are being designed into tools by the most enlightened engineering departments . . Jig ground the hardened die, stripper plate, and die holder all fit together . . uniform clearance means longer runs.

ADVANTAGES! the investment is less than for many Jig Boring accessories such as a rotary table . . the Vulcanaire can be put on and taken from the machine in a few seconds . . the Vulcanaire is completely portable (all accessories are platform mounted) . . the system can be used between several machines of various capacities . . employing both the 10,000 and 20,000 series, components with various sized holes from the very smallest to 4" in diameter can be Jig Ground . . the average Jig Borer operator becomes proficient at Jig Grinding after very little experience.

TOPS IN PRECISION . . the Vulcanaire is precision built throughout and is constructed of alloy and tool steel. Super precision bearings, preloaded with our special fixtures are used, with all traces of radial and end clearances removed, resulting in Vulcanaire Jig Grinding to "tenths" . . for quotation and literature please mention machine tool application.

VULCAN TOOL CO.
Pritz Ave. Dayton 10, O.





10,000 SER. 1/16"-1½" HOLES PUT ON TAKE OFF EASILY

20,000 SER. 1½"-4" HOLES ADAPTORS INTERCHANGEABLE

FOR JIG BORERS OR MILLS

Superlative Accuracy

Van Keuren ... MEASURING TOOLS

VK MICROGAGE SET M-21

For setting large micrometers and for checking large parts. Contains 1", 2", 3", 4", 5" and 6" microgages ⅞" in diameter and accuracy to +.000010" —.000005" per inch of length. This set provides 21 inches of dependable standards.

Complete in mahogany case **$60.00.**

VK Micrometer Squaring Fixture and 4" x 4" Precision Lap

Squaring fixture for ¼" or .270" dia. spindle	$15.00
Double surface 4"x4" precision lap	$15.00
¼"x1¼" anvil lap	$ 1.50
Kit, complete with instructions	$31.50

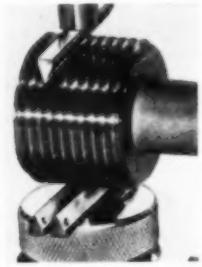
VK Double Surface Fused Quarts Optical Flats Are Always Accurate.

2"	Working Flat	.000004"	accuracy $35.00
3"	Working Flat	.000002"	accuracy $65.00
4"	Working Flat	.000004"	accuracy $140.00

There is no perceptible change with time or temperature. They have a useful life 10 times that of glass flats.

VK 10" Diameter Double Surface Pack Hardened Steel Precision Bench Plate. — Two Reference Surfaces of Known Permanency.

Precision ground within .00005". It's a honey. The surfaces are so perfect that they can be tested with light waves. Price $125.00



VK ROOT DIAMETER WIRES

One set checks any 55° or 60° thread from 4½ to 64 threads per inch.

$10.00 each or $25.00 per set of three wires.

Accurate within .00025". It's a cinch to machine or grind 30°, 45°, 60° or 90° accurately with these tools.

VK 45° AND 60° SHOP TRIANGLES

Specifications and prices:

No.	Angle	Base	Height	Width	Weight	Price Each
1	45°	3⅞"	3⅛"	1½"	1½ lb.	$10.00
2	60°	3⅜"	5⅛"	1½"	1½ lb.	$10.00
3	45°	5½"	5½"	2⅛"	4 lb.	$15.00
4	60°	5⅞"	8½"	2"	5 lb.	$15.00

VK Standard Measuring Balls for Measuring Splines, Dovetails and Angles.

1" length and accurate to .00002". The set includes two balls each of the following sizes:

.050", .0625", .100", .125", .150", .1875", .200", .250", .300", .400", .500", .600", .700", .750", .800", .900", and 1.000".

Complete in mahogany case $185.00.

VK CATALOG AND HANDBOOK No. 34

This 208-page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screw threads and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies free upon request

THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

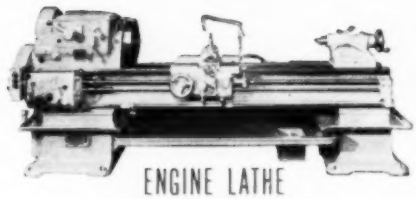
30th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

SPRINGFIELD LATHES

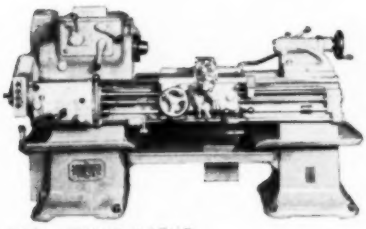
Solve every lathe turning problem

Adaptability to every lathe turning problem and extreme versatility are characteristic of Springfield Lathes. Built with close precision and strict adherence to the highest standards for each component part, they are rugged, reliable, accurate performers on all types of work.



ENGINE LATHE

Anyone of the 16 speeds can be selected quickly and easily to meet the requirements of the tool and the work. Low speeds for heavy cuts or high speeds for carbide cutting tools are instantly available. The Springfield 3-lever speed shifting system reduces the amount of shifting required in the normal sequence of operations.



TOOL ROOM LATHE

Sixty quick change threads and feeds give an exceptionally broad setting for many kinds of work. Threads such as 11½ and 27 pitch which usually require transposition gears are included in these ranges and the standard feeds and threads can be varied greatly.

Easy to set up and operate, these modern lathes are noted for their wide application and their accurate, sustained performance on all lathe turning work. Ask about their adaptability to your own turning problem. Springfield Lathes can solve them—and on a high production schedule.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

WHEN YOU NEED SET SCREWS,

SPECIFY UNBRAKO SELF LOCKERS

Reg. U. S. Pat. Off.

(A)
Pat. & Pats. Pending

"UNBRAKO"
KNURLED
CUP POINT

(B)
Pat'd.

"UNBRAKO"
KNURLED
THREAD

(C)
Pat'd and Pats. Pend

"UNBRAKO"
SQUARE HEAD
KNURLED CUP POINT

. . . they won't shake loose!

Set screws must *"stay put."* To make sure they do—Lock them! Yes, no matter what your set screw application may be—there's an "UNBRAKO" Self-Locking Set Screw to *lock* your requirements, because all patented "UNBRAKO" Set Screws are made SELF-LOCKING through KNURLING.

(A) The patented Knurled Cup Point of this popular "UNBRAKO" Socket Set Screw makes it a Self-Locker, because the edges of the counter-clock-wise knurls positively prevent creep, regardless of the most chattering vibration.

(B) The patented Knurled Thread of this "UNBRAKO" Socket Set Screw is swaged—making it a most excellent Self-Locker for applications requiring cone, oval, flat or other points except cup, and for use with hardened shafts.

(C) The patented internal or external knurling on the Cup Point of this "UNBRAKO" Square Head Set Screw also makes it a Self-Locker—for all applications where cup point set screws can be used.

Knurling of Socket Screws originated with "Unbrako" in 1934.

Write us for the name and address of your nearest "UNBRAKO" Industrial Distributor and for your copy of the "UNBRAKO" Catalog.

OVER 46 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNSYLVANIA, BOX 4

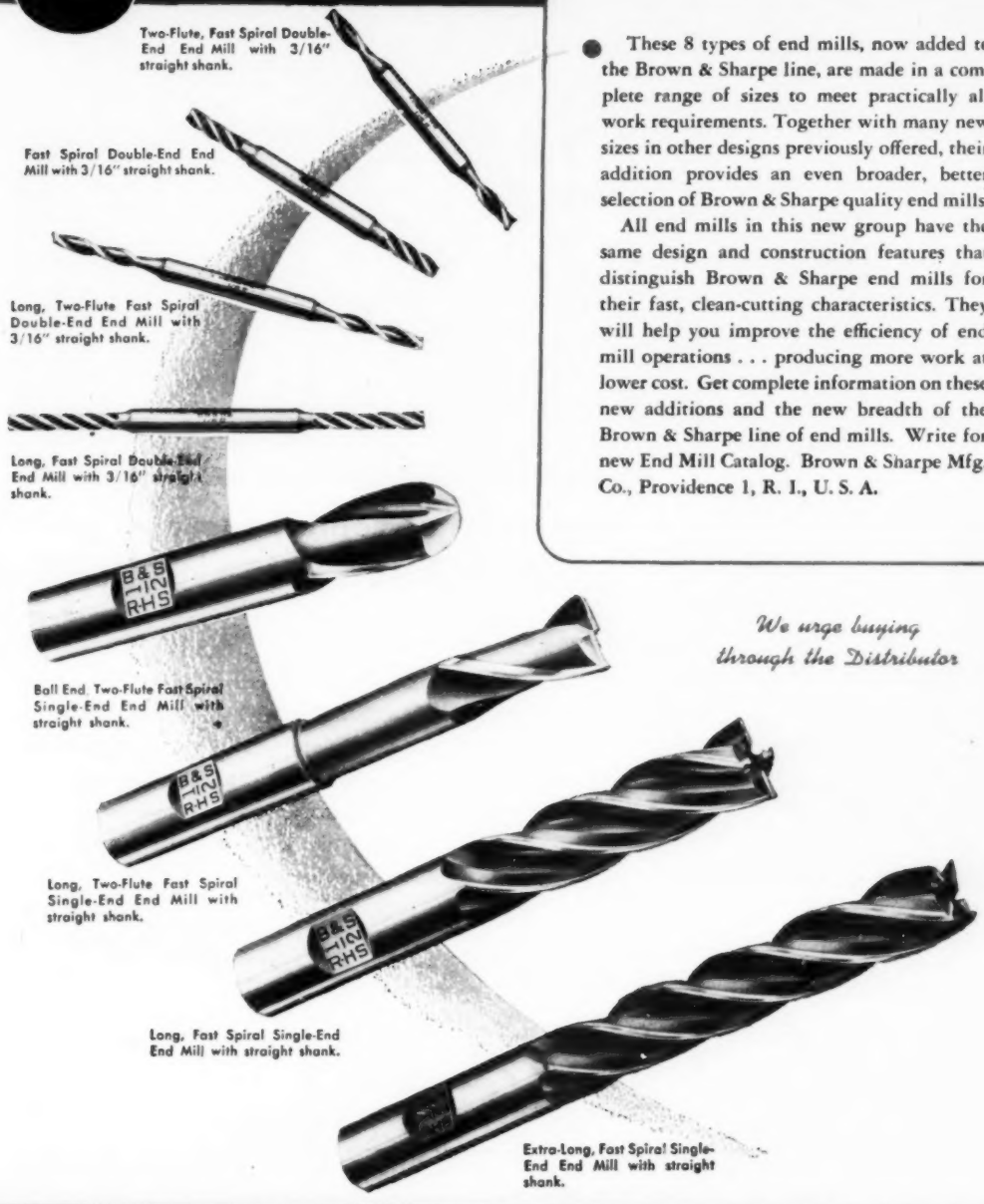
BRANCHES: CHICAGO · DETROIT · ST. LOUIS · SAN FRANCISCO

FOR A BROADER, BETTER SELECTION

BROWN & SHARPE *offers*

8

ADDITIONAL TYPES OF END MILLS . . .



Two-Flute, Fast Spiral Double-End End Mill with 3/16" straight shank.

Fast Spiral Double-End End Mill with 3/16" straight shank.

Long, Two-Flute Fast Spiral Double-End End Mill with 3/16" straight shank.

Long, Fast Spiral Double-End End Mill with 3/16" straight shank.

Ball End, Two-Flute Fast Spiral Single-End End Mill with straight shank.

Long, Two-Flute Fast Spiral Single-End End Mill with straight shank.

Long, Fast Spiral Single-End End Mill with straight shank.

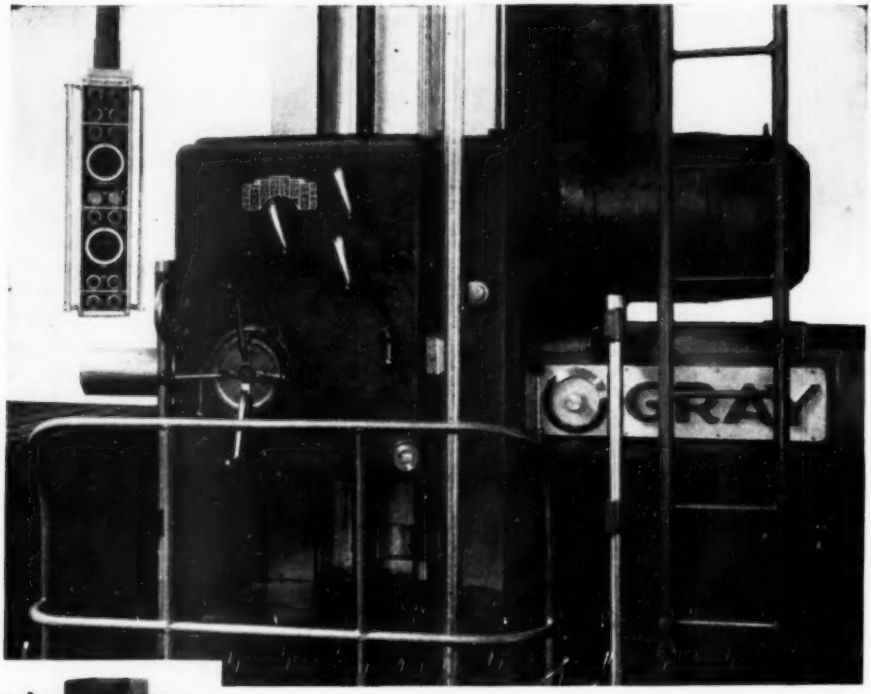
Extra-Long, Fast Spiral Single-End End Mill with straight shank.

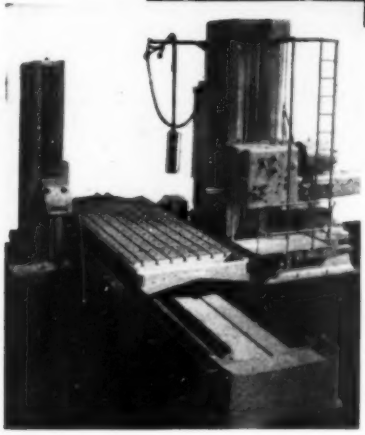
These 8 types of end mills, now added to the Brown & Sharpe line, are made in a complete range of sizes to meet practically all work requirements. Together with many new sizes in other designs previously offered, their addition provides an even broader, better selection of Brown & Sharpe quality end mills.

All end mills in this new group have the same design and construction features that distinguish Brown & Sharpe end mills for their fast, clean-cutting characteristics. They will help you improve the efficiency of end mill operations . . . producing more work at lower cost. Get complete information on these new additions and the new breadth of the Brown & Sharpe line of end mills. Write for new End Mill Catalog. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

We urge buying through the Distributor

BROWN & SHARPE CUTTERS B·S





Simplicity of control features new GRAY PLANER TYPE BORING, DRILLING and MILLING MACHINE

A glance at the head and pendant switch of the new GRAY PLANER TYPE HORIZONTAL BORING, DRILLING AND MILLING MACHINE will convince you of the simplicity and almost self-evident means of control. This simplicity and convenience enables the operator to turn out more work with less physical and mental strain, for he handles the machine with complete confidence and a minimum of effort.

Write for fully illustrated descriptive Bulletin No. 54

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.

SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

NEW SIMOMETER

gives you accurate **TESTED TENSION** in less than 1 minute per blade

Here's how SIMONDS Quick and Easy Tensioning Method gives you LONGER BLADE LIFE!

Avoid Undertension which causes crooked cutting, spoiled work, lost time.

Avoid Overtension which causes blade-vibration, rapid dulling of teeth, frequent blade-breakage.

Slip the Simometer Directly over Blade, tighten two thumbscrews . . . now put tension on blade until **Simometer** needle moves into green zone . . . and you *can see at a glance* you have the right tension on the blade.

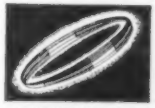
Then You're Set to get Faster, Straighter Cuts... and more cuts per blade... *the full measure* of performance which **SIMONDS** "Red End" Power Blades are made to give you. Ask your distributor.

BRANCH OFFICES: 1550 Columbia Road, Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 416 W. Eighth St., Los Angeles 14, Calif.; 220 First St., San Francisco 5, Calif.; 311 S. W. First Avenue, Portland 4, Ore.; 51 W. Trent Ave., Spokane 8, Washington. Canadian Factory: 595 St. Remi St., Montreal 30, Que.

SIMONDS ALSO MAKES:

FLAT GROUND STEEL STOCK (Oil Hardening)

"RED TANG" FILES


METAL-CUTTING BAND SAWS (Regular Hard Edge, Skip-Tooth, Spring Temper)

CIRCULAR METAL-CUTTING SAWS (Inserted-Tooth, Segmental, Solid-Tooth)

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.
Other Divisions of SIMONDS SAW AND STEEL CO. making Quality Products for Industry

SIMONDS — Special Electric Furnace Steels
SIMONDS — Grinding Wheels and Grains
SIMONDS — Simonds Products for Canada

SIMONDS "Red End" HACKSAW BLADES

WHEN YOU USE SIMONDS YOU STAY IN THE HIGHLANDS . . . OF CONSISTENT CUTTING EFFICIENCY

ARMSTRONG

More Tools Per Man for More Profit

Even when labor was cheap and tools were costly, it was the best tooled shops that prospered. Now with wages higher and the work days shorter, it becomes imperative that every worker be supplied with every tool that will increase his hourly production.

See that each lathe, planer and shaper operator has the correct ARMSTRONG TOOL HOLDERS for each operation he performs. Equip each machine with its full complement of ARMSTRONG Setting-up tools. Use better balanced, handier ARMSTRONG WRENCHES on machines and assembly lines. Specify ARMSTRONG Drop Forged "C" Clamps and Lathe Dogs. . . . Today, only quality tools can be truly economical.

Write for the NEW S-48 Catalog just released. It has page after page of production-increasing, cost-cutting tools.

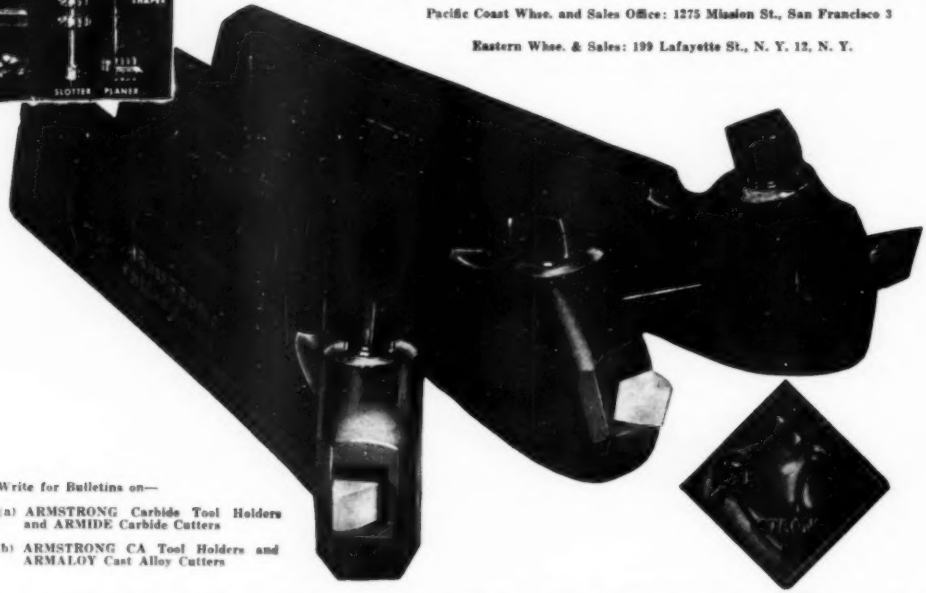
ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 West Armstrong Avenue — Chicago 30, U. S. A.

Pacific Coast Whse. and Sales Office: 1275 Mission St., San Francisco 3

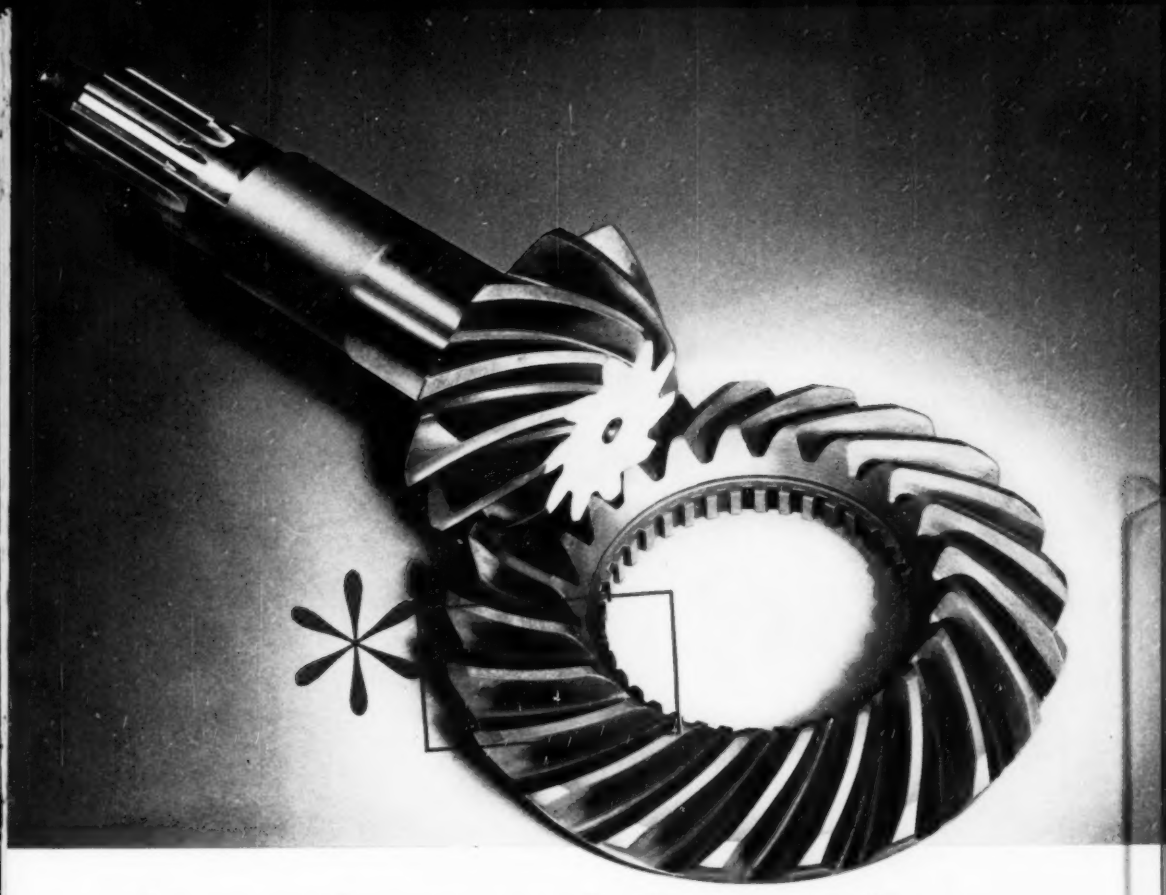
Eastern Whse. & Sales: 199 Lafayette St., N. Y. 12, N. Y.



Write for Bulletins on—

(a) ARMSTRONG Carbide Tool Holders and ARMIDE Carbide Cutters

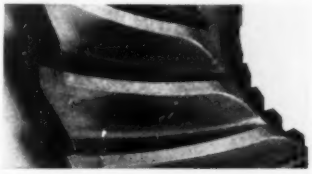
(b) ARMSTRONG CA Tool Holders and ARMALOY Cast Alloy Cutters



These marks are proof of physical fitness

THESE spiral bevel gears have a long, hard-working, quiet life ahead of them, as you can see clearly by the unretouched "test-marks" in the photograph at the right. These marks are made by coating the teeth with a pigment, then running the gears in proper position to remove the coating where tooth contact occurs. Observe the *uniformity* and the *localization* of tooth contact at the central portion of each tooth: proper for this application—proof of physical fitness for the job.

There's no magic to making gears as sound and as silent as these. We establish one *and only one* set of standards—then stick to it. Our men know our standard and hold to it—day after day—at every stage of operation from blanks to final lapping. That's the *only* way we know how to do business. If this fits in with your ideas, give us a call. Our engineers can start from a sketch, print, or at any stage of the development. Any time you say.



* *Uniform contact, localized at the strongest portion of each tooth is proof of maximum wear.*

DOUBLE DIAMOND TRADE MARK GEARS

Made by

Automotive Gear Works, Inc.

RICHMOND, INDIANA

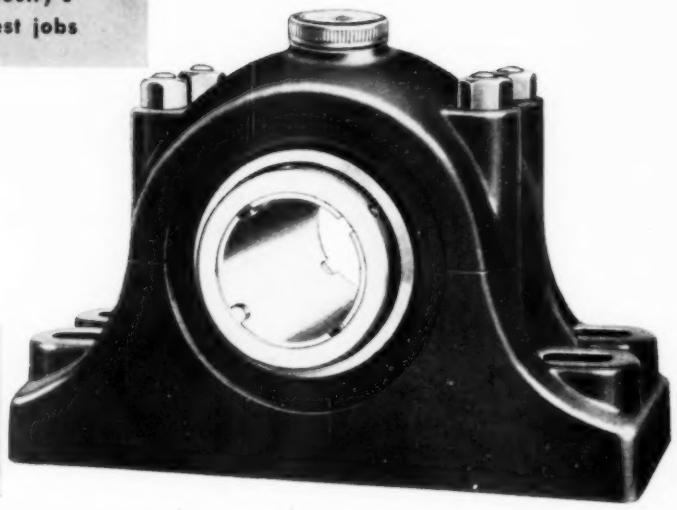
• • • • • FOR AUTOMOTIVE FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS • • • • • •

®Reg. U.S. Pat. Off.

Quality-proved by use on millions of industry's toughest jobs

Mounted, sealed, housed, fully assembled, ready to lock on the shaft

Delivered from stock in 4 basic types and a vast range of sizes



"DODGE-TIMKEN" MEANS QUALITY!

OTHER DODGE "FIRSTS"

TAPER-LOCK SHEAVES
Easy on — easy off — holds fast to the shaft.

ROLLING GRIP CLUTCH
No toggles! Great flexibility — positive drive.

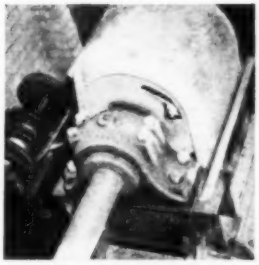
"SC" BALL BEARING
Pillow Block with new Neoprene metallic-backed seal.

It was Dodge who took the famous Timken Bearing, mounted it, sealed it, housed it and delivered a pillow block of new high quality—fully assembled, ready to lock on the shaft and carry the power loads of industry with new efficiency.

Power savings, improved machine operation, reduced maintenance, elimination of spoilage and steadier production—all result so regularly from the application of Dodge-Timken Bearings that this great line is widely accepted as the standard for comparison in up-to-date power transmission layouts.

Ask the Transmissioneer, your local Dodge Distributor, how these bearings and other Dodge "firsts" can help you achieve better, more economical production.

DODGE MANUFACTURING CORPORATION, MISHAWAKA, IND.



100-TON PULL

Three Dodge-Timken Pillow Blocks carry the load of a 100-ton pull of castings in and out of a shot blast chamber for the Falk Corporation, at Milwaukee. The bearings save the gear reducer from side pull and allow the shaft to turn easily even while taking the full load. Perfect operation for 8 years to date.

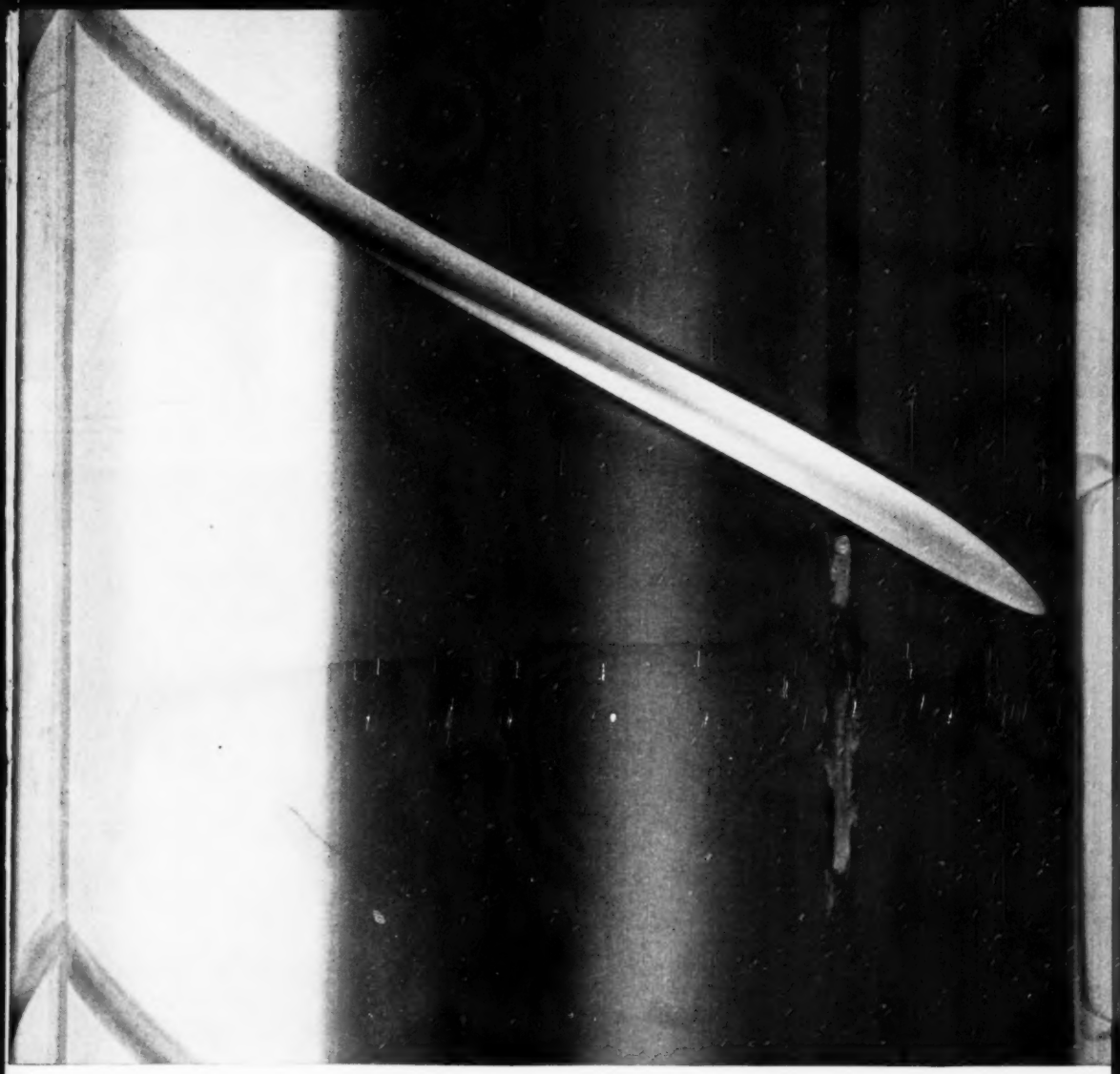
DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER. Look for the name of the Transmissioneer, your local Dodge distributor, under "Power Transmission Equipment" in your classified telephone directory.

NAME PLATES

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA, 1520 MONTANA STREET, CHICAGO 14, ILLINOIS



SUPERFINISH...

modern preventive for metal "skin wounds"!

This *unretouched* enlargement shows the surface of a spindle quill—ground and chrome plated. It was scored and damaged as the machine was jarred in shipment. Had the part been Superfinished *before* plating, the soft underlying "smear metal" caused by grinding heat would have been removed, leaving a hard surface far less susceptible to such "skin wounds."

Superfinishing is a real economy wherever maximum bearing life is desired. If you don't have the textbook, "Wear and Surface Finish," request it on your company letterhead.

GISHOLT MACHINE COMPANY
Madison 10, Wis.

THE GISHOLT ROUND TABLE

represents the collective experience of specialists in machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

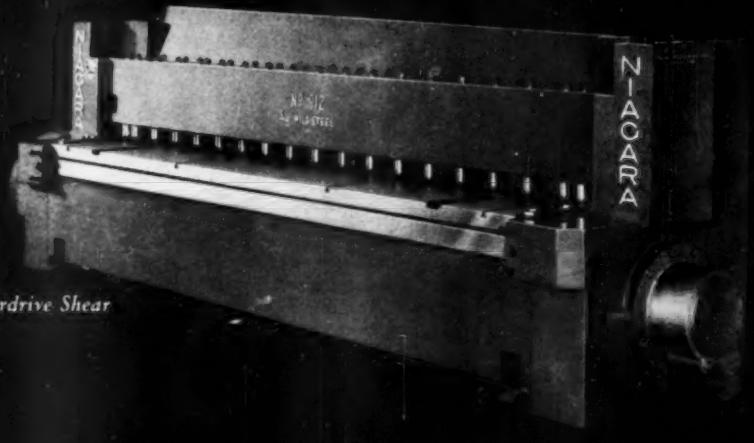
TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

FOR ADVANCED DESIGN *look into....*

NIA

Niagara Double Crank Press

Niagara Deep Throat Press



Niagara Underdrive Shear

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, N. Y.

GARA

• The modern design of Niagara Presses, Shears and other machines for plate and sheet metal work is proof of the Niagara talent and experience that is built into them. Men responsible for economical production appreciate these results of Niagara engineering,—high hourly output...convenient operation...accurate work...reliable, uninterrupted performance with minimum down time...low maintenance cost.

Write for Bulletins

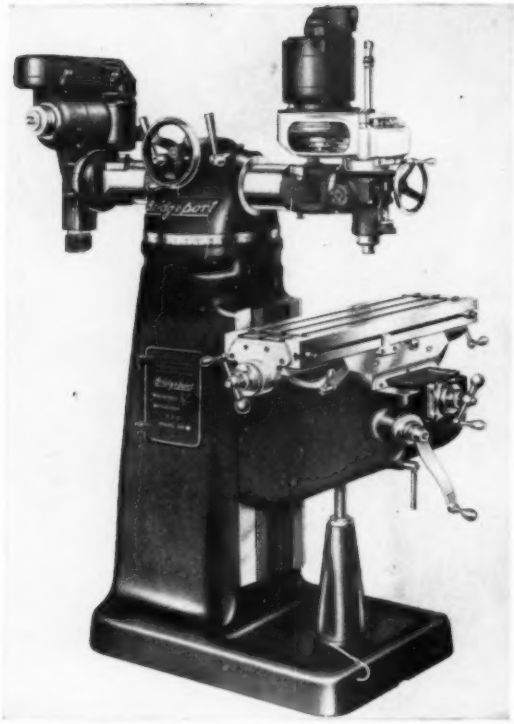
Niagara Double Crank Gap Press

America's most complete line of

PRESSES, SHEARS, TINNERS TOOLS AND MACHINES FOR PLATE AND SHEET METAL WORK

District Offices: Detroit, Cleveland, New York

It doesn't cost much to make BIG SAVINGS with Bridgeport TURRET MILLING MACHINES



"BRIDGEPORTS" differ from other machine tools in that they mill, drill, bore and shape . . . at all angles of the work with ONE SET UP. In this difference lies their cost cutting possibilities.

Coupled with the speed, convenience and accuracy with which these operations are handled is a moderate first cost of the machine itself. That is why the more than 10,000 Bridgeport Turret Milling Machines delivered to their owners over the past ten years have proved of such high investment value. They have paid their way many times over in shops from Coast to Coast.

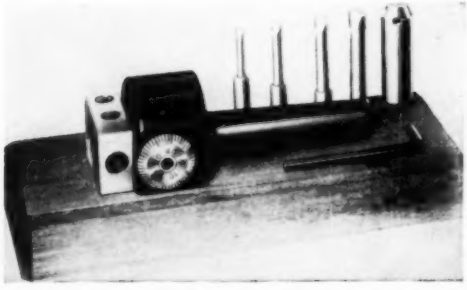
We suggest you investigate . . . *NOW!*

• SPECIFICATIONS •

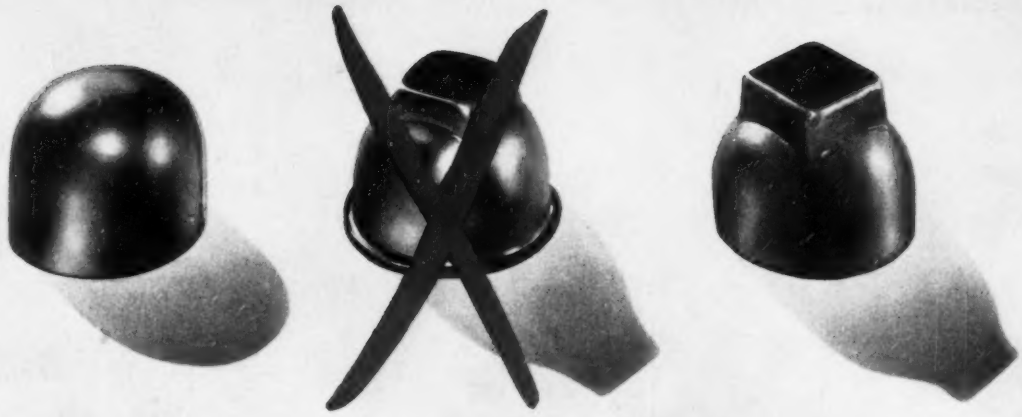
Longitudinal Feed — 20" with standard 32" table. Cross Feed — 9". Vertical Feed of Knee — 16". Tables 36", 42" and 48" are available; also longitudinal power feed. Weight with Shaping Unit — 2000 lbs.

BRIDGEPORT No. 1 BORING HEAD

Designed for the "Bridgeport" but equally adaptable to other machines. An attachment that greatly extends the utility of any milling machine. Diameter of head, 2¼". Adjustment of slide, ⅜". Three holes for ⅜" diameter boring tools provide more than 5" range. Complete with 5 boring tools and necessary wrenches.



Bridgeport MACHINES, INC.
Bridgeport, Connecticut



Eliminates one of three stamping operations

A COSTLY sulfurized mineral-lard oil was used in stamping operations at the Monroe Tool & Manufacturing Co., Monroe, Michigan. Three operations (indicated above) were needed to produce hub caps from $\frac{1}{8}$-inch stock.

After a survey of all stamping operations, a Standard Oil Cutting Oil Engineer recommended Stanostamp S Compound. The switch eliminated the second pass.

On another stamping job—producing the gear housing shown below—Stanostamp S made unnecessary a copper-plating process used to prevent breakage of sharp corners. In addition, on all stamping operations, die life was greatly increased and die polishing was cut to a minimum.

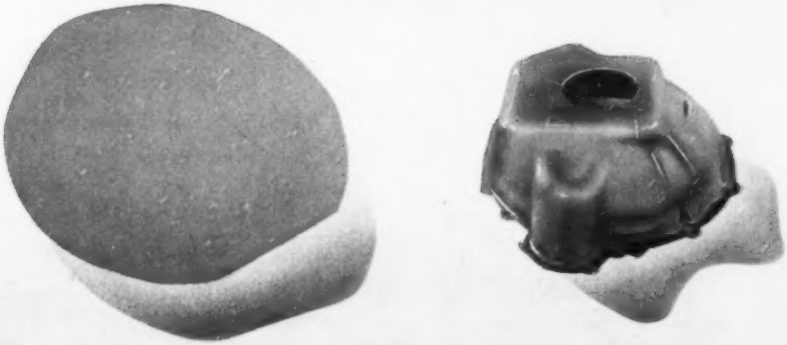
Many hours of production and tool-room time were saved through these recommendations by a Standard Oil Cutting Oil Engineer. They are typical of savings available to you through a combination

Stanostamp S Compound

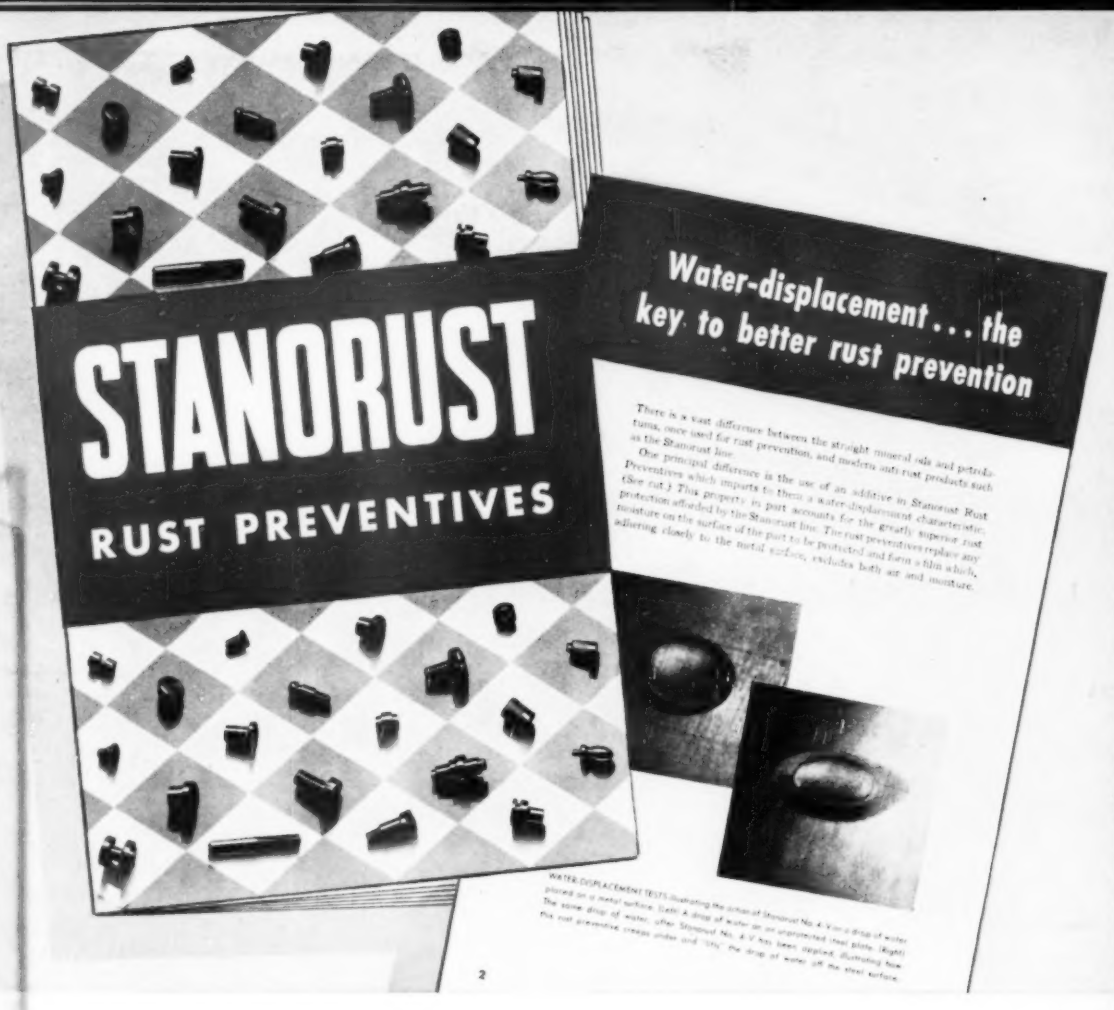
of expert engineering service and highest quality products for metal working.

If your plant is located in the Midwest, write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois, to secure the services of the Engineer nearest you.

corner-breakage eliminated



STANDARD OIL COMPANY (INDIANA) STANDARD



Here's the answer to your rust prevention problems

THE BOOKLET illustrated above holds the means to more complete and more economical rust control in your plant. It will help you analyze your rust prevention problems and needs. It tells how the new, improved Stanorusts now fully meet these needs.

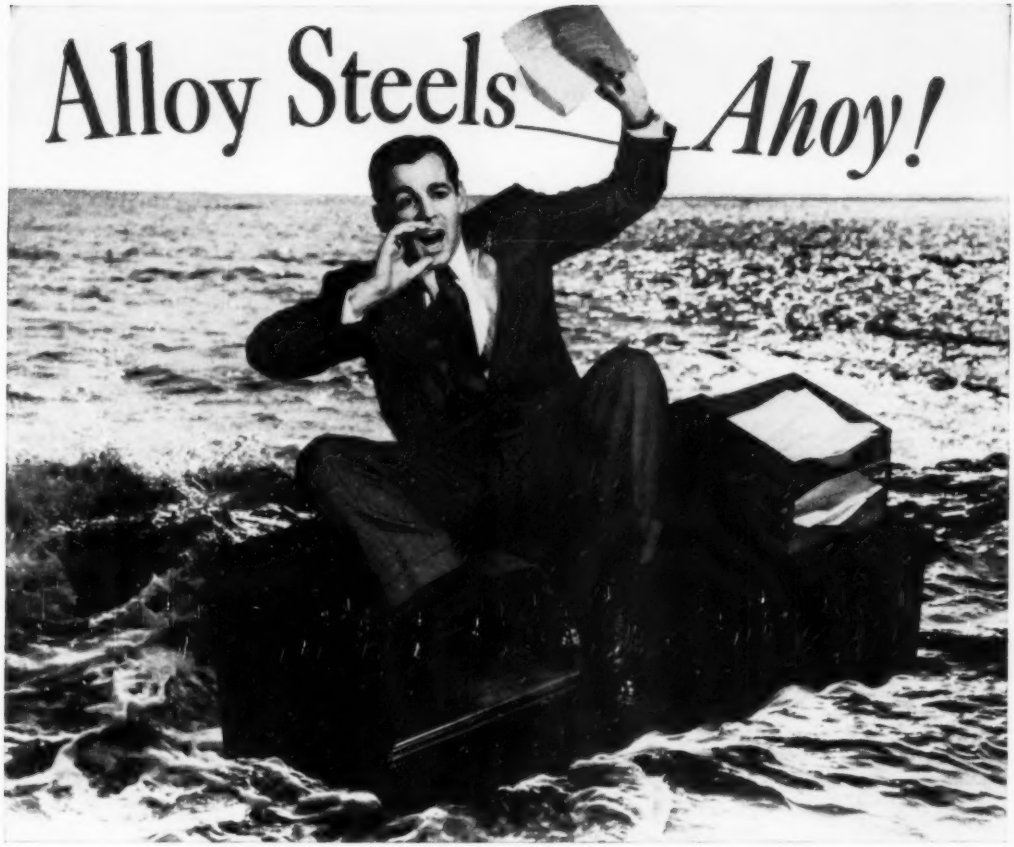
The eight grades of Stanorust are described. They range from a fingerprint remover to a heavy, petrolatum-type product that protects against corrosion under the most severe outdoor exposure for years.

Find out why Stanorusts can mean big savings for you through better rust protection. Send for this booklet. Write for your copy today. Simply address your letter to Standard Oil Company (Ind.), 910 S. Michigan Ave., Chicago 80, Ill.

Send for a copy

STANDARD OIL COMPANY (INDIANA) STANDARD

Alloy Steels Ahoy!



ARE you all at sea about alloy steels? Do you want help in using them? Give Carnegie-Illinois a hail.

We can show you how to keep from going adrift amid the countless types of alloy steels now available, how to chart a safe course in selecting the proper type for any job that requires high service performance and low maintenance costs, how to treat the steel in your shop to get best results in fabrication and in operation.

To find out what the fine alloy steels we produce have to offer you, how they differ one from the other, and why we are in the best position to assist you in their application, send for a copy of our recently published book "U·S·S Carilloy Steels." And when you're ready for specific, practical metallurgical assistance that's based on the latest experience with alloy steels, ask one of our service metallurgists to drop around.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST TO COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH

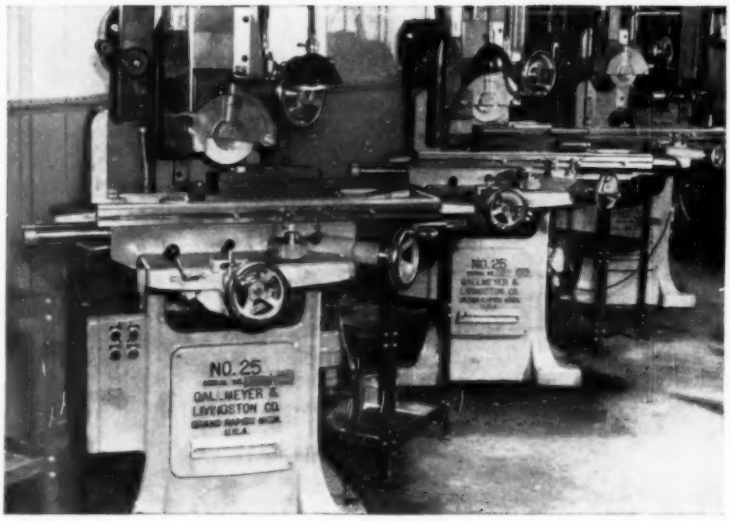
COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

USS

9-514

UNITED STATES STEEL

Enthusiastic Customers do our BEST advertising



In one of the world's largest electrical equipment plants, three of a battery of eight Grand Rapids No. 25 Hydraulic Feed Surface Grinders precision grinding lamination dies for motor stators.

Whether your problem is surface grinding small parts or machinery sub-assemblies, you will appreciate the micro-inch finish produced at production speeds on Grand Rapids Grinders. You can be sure of this micro-accuracy combined with long-life and ease of operation because all Grand Rapids Hydraulic Feed Surface Grinders have these outstanding features: a one-piece column and base casting for vibrationless rigidity; precision ball-bearing spindle which is greased for life; Bijur one-shot lubricating system eliminating hand oiling; patented vertical movement of wheel head for quick, accurate adjustments; portable coolant tank for ease of coolant replacement; vane type hydraulic pump for fast longitudinal table travel.

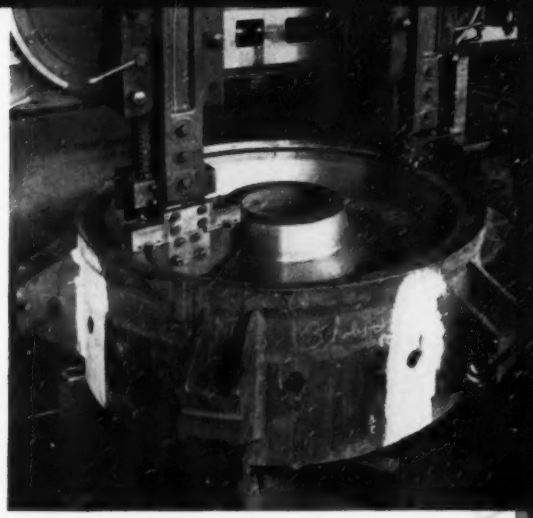
to serve you—

Your inquiry concerning your specific grinding needs will receive prompt attention. Grand Rapids Grinders include: Hydraulic Feed Surface Grinders, Universal Cutter and Tool Grinders, Hand Feed Surface Grinders, Drill Grinders, Tap Grinders, and Combination Tap and Drill Grinders.

GRAND RAPIDS GRINDERS

GALLMEYER & LIVINGSTON COMPANY

330 Straight, S. W., Grand Rapids 4, Mich.



MORE SPEED!
MORE POWER!
MORE PRODUCTION!

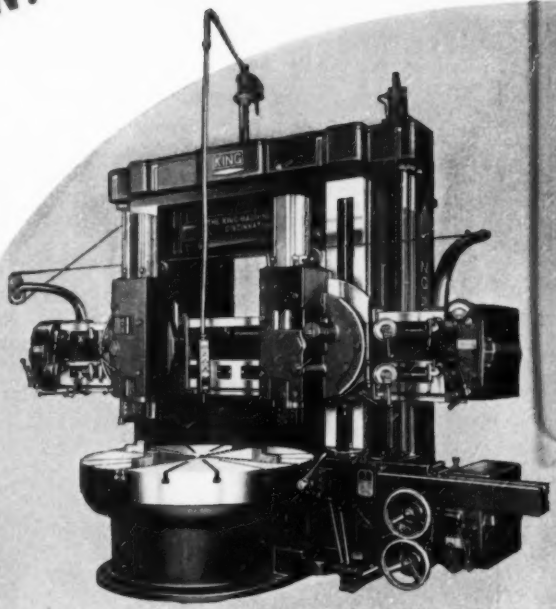
With the New Series KING

VERTICAL BORING & TURNING MACHINES

If your production involves boring, facing, turning, and similar operations, there's a New Series KING that will handle it easier, faster, at less cost.

Because they are substantially HEAVIER, these new KINGS have the rigidity, power, and range of feeds and speeds essential for successful use of carbide tools. New rectangular-type rams have eight bearing surfaces, are fitted with four taper gibs for accurate alignment. Centralized controls save time on the job and *between* jobs.

Call in a KING engineer—let him show you exactly *how* you can save time and improve quality on your boring, facing, and turning work.



New Series KING Machines are made in ten sizes: Single Column, one head on rail, 30", 36", and 42" swing; Double Column, one or two heads on rail, 52", 62", 72", 84", 100", 120", and 144" swing. All available with or without side head. Write for specifications on the size machines that meet your work requirements.

American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

Hand methods are slow and costly.

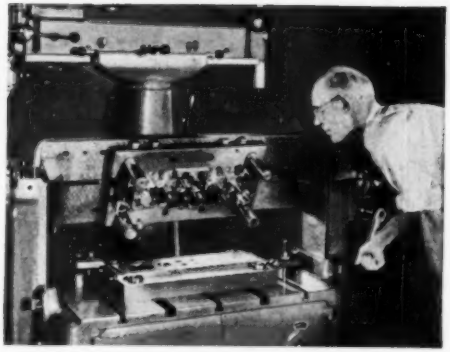
Die assembling now mechanized

Is your toolroom still in the grunt-and-groan era of trying out and assembling large dies? Then it's time you investigated the revolutionary new Moore Die Flipper.

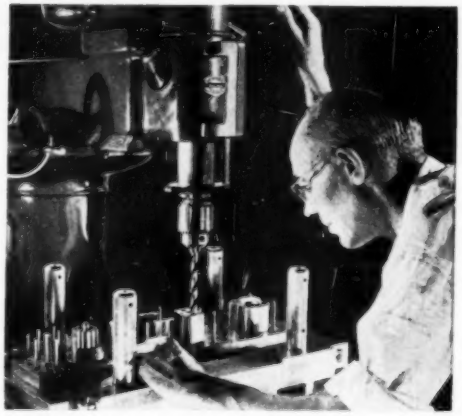
Without physical effort one diemaker can perform all the operations of die-assembling: Take apart, turn over, drill, tap and try out. The Die Flipper will be a money-saver in your toolroom from the start, for it can also be kept busy as a radial drill.

An eight-page catalog, with over 20 photographs and drawings, is just off the press. It's yours for the asking.

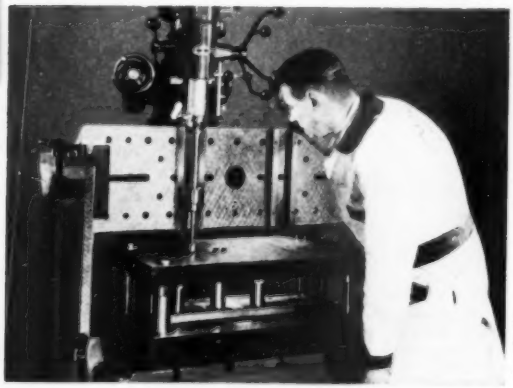
MOORE SPECIAL TOOL COMPANY, INC.
738 UNION AVENUE, BRIDGEPORT 7, CONNECTICUT



With the Moore Die Flipper 1 man does the work of 3.

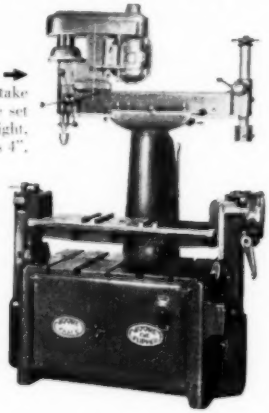


Drilling punch in place. Spring holes are also drilled. Radial drill has 1½" capacity. Tapping is done in same set-up with Lassy Tap Set.



← Counterboring for heads of screws tapped into punch flange, showing the use of ¾" chuck with long shank.

Moore Die Flipper stands → 5'x6'x7½' high. It will take apart and flip over a die set 20"x40" with 12" shut height, pins engaged in bushings 4".



ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS **JIG GRINDERS** **DIE FLIPPERS**

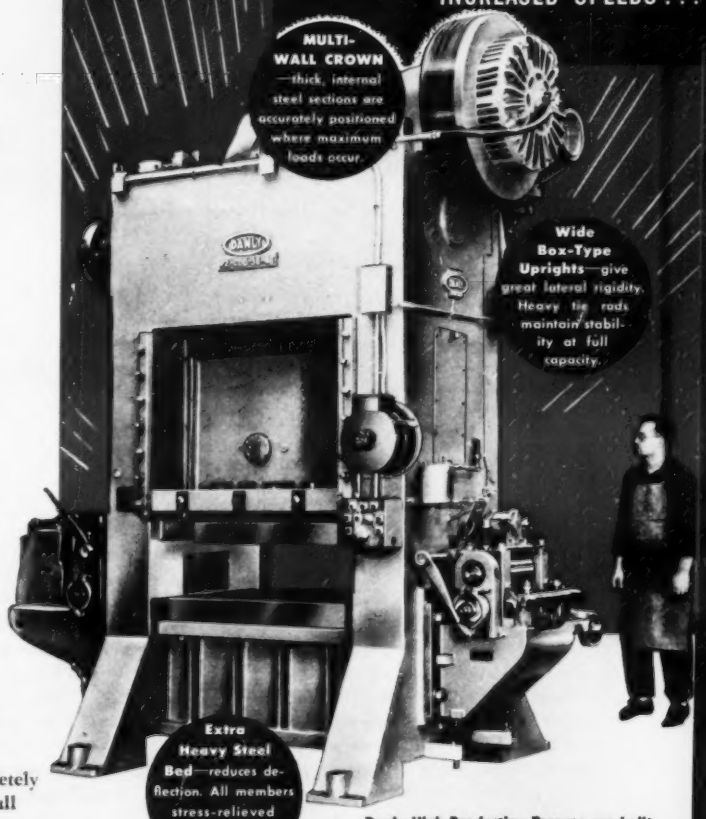
PANTO-CRUSH WHEEL DRESSERS **HOLE LOCATION ACCESSORIES**

DANLY HIGH PRODUCTION PRESSES

Open New Fields

in the GREAT MIDDLE RANGE of STAMPINGS

REDUCE VIBRATION AND DEFLECTION ... AUTOMATIC PRODUCTION AT INCREASED SPEEDS ...


MULTI-WALL CROWN—thick, internal steel sections are accurately positioned where maximum loads occur.
Wide Box-Type Uprights—give great lateral rigidity. Heavy tie rods maintain stability at full capacity.
Extra Heavy Steel Bed—reduces deflection. All members stress-relieved for permanent stability.

Danly High Production Presses are built in a full capacity range between 50 and 800-tons. Straight-Side Units in single, double and triple-action types available in sizes up to 3000 tons.

● The new modern line of Danly High Production Presses is constructed *heavier* for the rated capacity of the press. The entire frame—the bed, box-type uprights, crown and tie rods—is designed and built to reduce vibration and deflection at *higher operating speeds.*

The resulting rigidity insures accurate die closures even under severe off-center loads. Less deflection gives you longer die life and more stampings per grind.

REDUCE UNIT STAMPING COSTS WITH AN AUTOMATIC SETUP

You can now get the full advantage of the use of *heavier gage coil or strip stock in an automatic setup.* Mass, strength, and speed are combined in these Danly presses to increase your production potential in the great middle range of stampings.

Write FOR MORE FACTS TODAY

It'll pay you to learn more about the many outstanding features of these completely new, modern presses. Write today for full details. Find out how they may be applied to your work to increase output and cut costs.

DANLY MACHINE SPECIALTIES, INC.
2200 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

DANLY

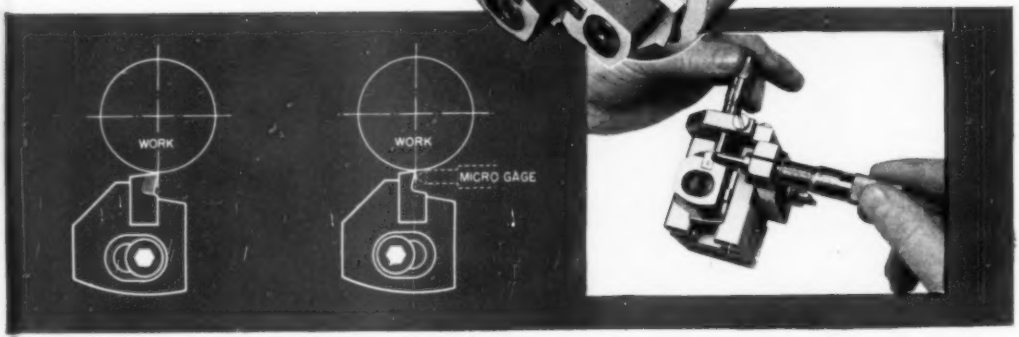
25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

MECHANICAL PRESSES AND PRESS EQUIPMENT

NO OTHER BLADE CHASER

has this two-way adjustment— for both Diameter and Wear

The new Adjustable Blade Chasers, applied to standard Vers-O-Tool heads, are positioned to the specified cutting size by positive, quick diametric adjustment of the head.



New chaser, with block offset to left—cutting edge up to proper working position. At least six regrinds available.

Reground chaser, with block offset to right to compensate for wear—cutting edge still up to proper position.

The double-barrel micrometer gauge, made famous for checking Namco Circular Chasers, is equally applicable for use with the new Adjustable Blade Chasers. It provides accurate determination of the exact amount of metal to be removed in grinding—and a positive check of the reground blades.

The cutting edge is *always* up to the center line—and there's no excuse for inaccurate grinding. The exclusive Namco Double-Barrel Micrometer Gauge takes care of that.

These are two important advantages of the new Namco Adjustable Blade Chasers, designed for use on standard DR, DS and DBS circular chaser heads. But there are other advantages, too.

Adjustable Blade Chasers will provide at least six regrinds—twice as many as conventional blade chasers. And they're so economical, you can use them on short-run jobs, broadening the use of Vers-O-Tool heads to *all* threading work in your shop.

These new Adjustable Blade Chasers, with their holders, are interchangeable with the famous Namco Circular Chasers which are ideal for the longer runs—and they're positioned to the cutting size in the same way, by the quick, positive diametric adjustment of the Vers-O-Tool.

May we show you how they'll increase your threading profits?

Ask for Catalog D-48

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley 4-6 and 8 Spindle Bar and Chucking Automatics • Single Spindle Automatics • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog • Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

"Me . . . stock all those endless V-Belt sizes?"

"Not since I use VEELOS"

"I can replace any V-belt in our plant with just these reels of Veelos."

That's a typical Veelos user telling you how Veelos cuts V-belt inventory. If you use O, A, B and C widths, four reels of Veelos give you a choice of more than 316 sizes. Use only A and B? Then two reels are all you need.

Buying matched sets of endless V-belts is costly. Forget it with Veelos. Forget, too, belt deterioration and obsolescence. Veelos on reels saves storage space . . . simplifies stock records.

Veelos is quickly and easily installed. On drives with fixed centers or outboard bearings, Veelos is installed without moving the motor or dismantling the machine. It provides substantial savings in installation and maintenance costs.

VEELOS
THE LINK
V-BELT

SEND FOR FREE VEELOS CATALOG. It shows how you can benefit from the many important advantages of Veelos. Fully illustrated. Complete engineering data. Write for it.

MANHEIM MANUFACTURING & BELTING COMPANY
MANHEIM, PA.

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Made in all standard sizes, fits all standard grooves. Packaged on reels in 100-foot lengths. Sales engineers in principal cities; over 300 distributors throughout the country. Veelos is known as VEELINK outside the United States.

"TEXROPE VARI-PITCH SPEED CHANGERS Boosted Our Output"

"With these clean, compact units we can change speeds without stopping, get in-between speeds we need," says spinning mill foreman.

STEP UP MACHINE OUTPUT in *your* plant with the same variable speed drive that makes spinning mill foreman Ralph Finkboner of Rochelle, Illinois so enthusiastic. Texrope Vari-Pitch Speed Changers give you smooth, accurate speed control at the turn of a crank. You operate your machines at exactly the right speed for highest production. You change to different speeds for different types of material in seconds.

V-belt drive cushions Texrope Vari-Pitch Speed Changers against shock loads. Design is simple, compact, smooth running and easy to keep clean. Capacities range from 1 to 75 HP with stepless speeds up to 3.75 to 1.

The Texrope line also includes Vari-Pitch variable speed drives with stationary or motion control which will solve many variable speed drive problems at low cost. For details on all Texrope drives, the most complete V-belt drive line on the market, see your A-C Authorized Dealer or District Office or write for Bulletin 20B6051G. Also in Sweet's.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices. Texrope and Vari-Pitch are Allis-Chalmers trademarks. A-2643

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

Sold . . .
Applied . . .
Serviced . . .

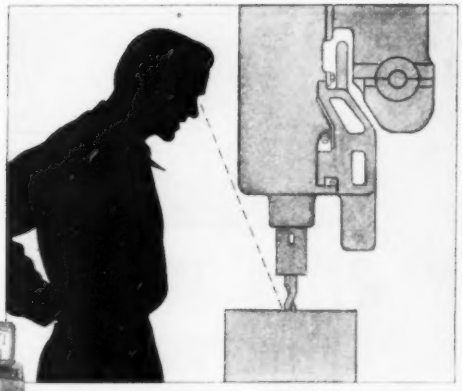
by Allis-Chalmers Authorized Dealers, Certified Service Shops and District Offices throughout the country.

MOTORS — ½ to 25,000 HP and up. Matching Allis-Chalmers Control.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

Powerful-



With the arm low or high, the operator always sees the work. Note the very slight projection of the Cincinnati Bickford head beyond the spindle.

Safe-Versatile-

Very powerful—very rigid—and yet extremely easy to handle.

All controls on the head low and close to the operator's hands, saving physical effort and giving the operator a clear view of the work on all jobs.

Outstanding safety features include Safety Elevating Nut, Spindle Catch, Power Rapid Traverse Safety, Feed Safety Clamping and Elevating Safety Interlock.

36 speeds and 18 feeds (4 speed ranges are optional) give a wide range of performance and versatility.

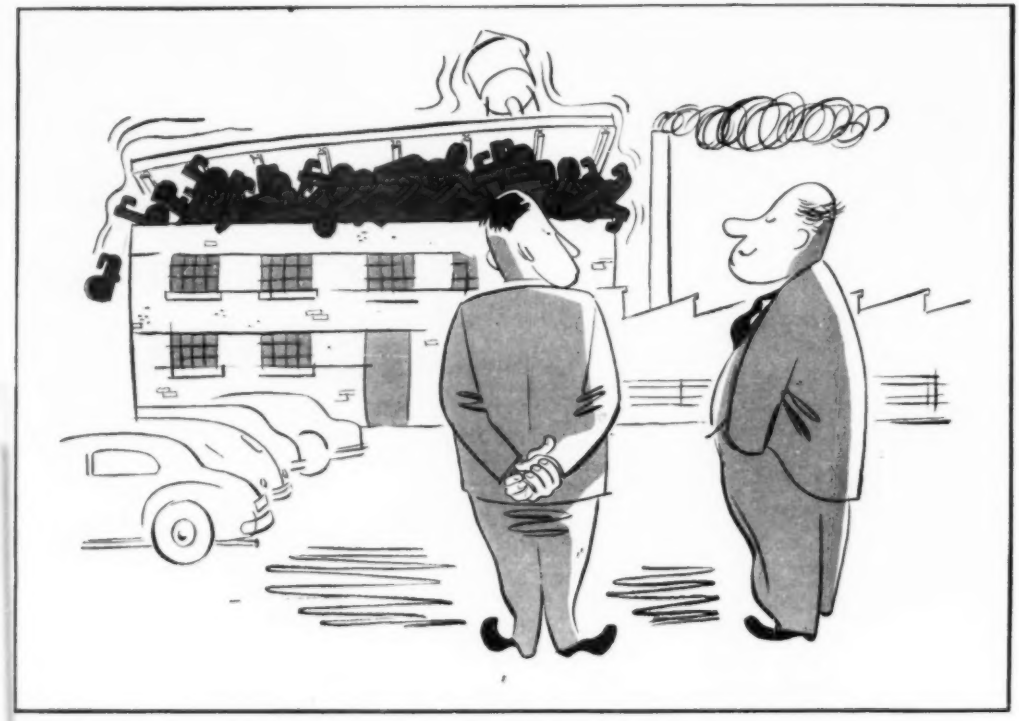
You may expect a sustained quality of work and fine production from these machines.

THE CINCINNATI BICKFORD TOOL CO.
SUPER SERVICE
RADIAL AND UPRIGHT DRILLING MACHINES
Radials 7½" dia. col., 2½" arm, to 26" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

Write for Bulletin R-29, and check the outstanding design and construction features.

THE CINCINNATI BICKFORD TOOL CO. Cincinnati 9, Ohio U.S.A.



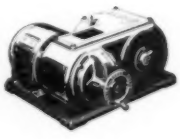
"Didn't I tell you **Reeves Speed Control** would raise our production ceiling?"

THE 3 BASIC REEVES UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

VARI-SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 15 hp.

MOTOMOTIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 20 hp.



● REEVES-equipped machines turn out more work and do more different jobs—more accurately and economically—because instant, infinitely variable REEVES Speed Control provides the right speed for every operation and every operator, under every changing condition. Specify REEVES Variable Speed Drives for your new machines—apply them to machines now in service. Let an experienced REEVES Speed Control engineer assist you in choosing the proper units for your operation from the complete REEVES line, including a wide range of designs, sizes and speed ratios—with manual, push-button or automatic control. Write for the 114-page catalog, No. A2-450A.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE

Reeves Speed Control

GIVES THE RIGHT SPEED FOR EVERY JOB!

SPOT NEWS OF METALWORKING

An electron diffraction instrument to determine effects of lubricants and of friction wear on polished jet engine parts has been developed by General Electric for National Advisory Committee for Aeronautics. Instrument detects in few seconds natural films emanating from the steel itself and chemical changes produced on the surface by lubricants.

General Motors has licensed Lincoln to use "Hydromatic" transmission. Detroit Transmission Division of GM will build the units, deliveries starting in April and official announcement to be made in May.

Note on easing in scrap market: one large steel user says that he now can trade heavy steel scrap for sheet steel pound for pound.

Soviets have fallen far behind schedule in production of spare parts for tractors, automobiles, and farm implements. No forged crankshafts were built during January because of clash between two ministries over manufacturing specifications. Shortage exists of special steel for plowpoints and plowshares. Ministry of Armaments has produced few chains and links necessary for repair of combines.

Special oil emulsion to cool high-speed carbide saws has been evolved so that still greater speed and longer runs between resharpening can be attained. Saws now run 8 hr. Polarizing theory is being used with lubricants. Long narrow oil molecules are deposited on work and, when polarized, stand on end, acting like nap on a velvet cloth.

General Motors workers will receive three-cent-an-hour increase May 29 guaranteed by "improvement factor" clause in union agreement recognizing workers' right to annual improvement in standard of living.

Drive to increase production efficiency by mutual aid has been launched by British Machine Tool Trades Association. Scheme will operate through central panel and regional panels in six districts. Program will consist of inter-factory visits (particularly by foremen) and study of cost systems, incentive methods, and manufacturing problems.

Dismissal of a union leader who instigated a strike in violation of the union contract by Stockham Pipe Fittings Co., Birmingham, has been upheld by NLRB trial examiner.

Honest differences of business taxpayers with Bureau of Internal Revenue could be settled without court action by a Tax Settlement Board set up by a bill before Congress. It has a good chance of being passed.

Far-reaching changes in production methods and processes to cut costs are now being discussed in top-level conferences in the automobile industry. Reason: the highly competitive market ahead and dim prospects of lowering labor rates. Automobile purchasing agents once again are wringing out pennies by "putting the squeeze" on suppliers. Motor car executives hope that savings will permit more than a token price cut later on in 1949.

Sand cast aluminum torque converter units are being produced for a prominent automobile company. They are much lower in cost than plaster castings. The finish of the blade is reported to be remarkably good.

Gaging Metalworking

With the spring pickup already showing in some areas, metalworking's prospects for continued high-level business are good. Steel production, of course, continues at peak. The automobile industry, too, is moving toward new records. March is expected to see more than 500,000 automobiles and trucks come off the line—and April and May may see even a larger number of assemblies.

Mild Winter Slowdown

That the winter slowdown in manufacturing was very mild is shown by the fact that the Federal Reserve Board's Index of Industrial Production stood at 191 in January, a drop of only 4 points from its peak in October. Preliminary estimates indicate that the February figure will be about the same, perhaps a point or two either way.

▸ Metalworking activity slowed only slightly in January—when the general slowdown was approaching a peak, as is shown in Bureau of Labor Statistics reports on hours and wages. An upturn in automobile assembly operations raised the average automobile workweek to 41.6 hours—a new record. That helped sustain the average for durable goods industries as a whole. Weekly hours in the division declined only from 40.8 to 40.5.

Weekly hours in electrical and non-electrical machinery declined significantly, reflecting slackening in production of radios and several appliance lines. But the gain in autos and continuing high activity in most other major groups kept metalworking as a whole close to peak levels.

Non-Ferrous Metal Price Cut

The two-cent break in lead prices was the first major price reduction in a primary non-ferrous metal since the war.

Market observers expected the break to bring almost automatic reductions in a wide variety of metals —such as solder, babbitt, and battery lead—of which lead is a component. For metalworking, of course, that meant relief in the material costs of many products.

▸ The break did influence the market for other metals. However, observers felt that lead had been in a much softer position than copper or zinc. Demand for lead had fallen sharply, partially because large users had been reducing inventories. Supplies of lead, meanwhile, had increased. Imported metal flowing into the country helped to ease the market. At week's end observers were watching other metals, anticipating a possible correction in their prices.

Aluminum Supply is Critical

The supply of aluminum is more critical than ever, partly because of military and aircraft demand. The power situation is a little better in this country, but there is no marked improvement in Canada. Some dissatisfaction is being voiced by long-time users of aluminum because aircraft companies are reported building up aluminum reserves over and above immediate needs.

The long-term outlook for aluminum is good, despite the seriousness of the current situation. One U. S. producer has an option on a Canadian site with a potential of 1 billion pounds per year. The earliest that aluminum would be available from this project, however, is about 1954.

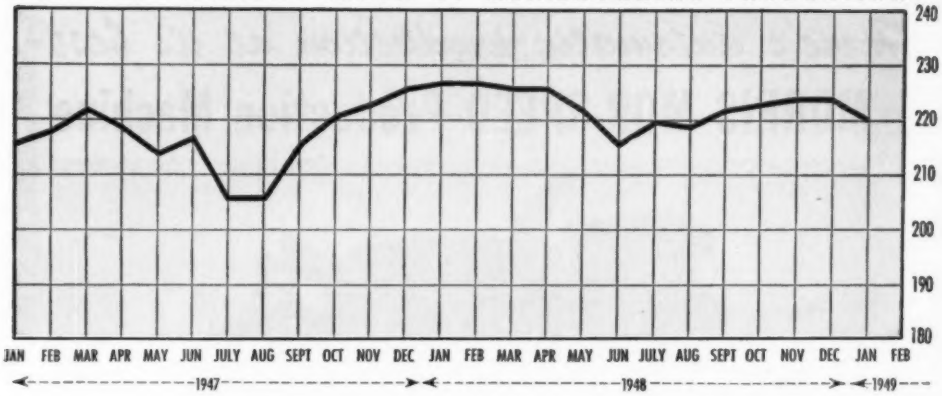
Nickel is hard to get, but still is not critical. Lack of power and of furnaces has reduced the output. But

FACTORY HOURLY EARNINGS CLIMB AS RETAIL FOOD PRICES DIP

	Retail Food Prices	Avg. Hrly Earnings Durables ¢ per hour
June 1948	214.1	138.5
July	216.8	140.7
Aug.	215.2	143.1
Sept.	211.5	144.8
Oct.	211.5	145.1
Nov.	207.5	145.2
Dec.	205.0	145.7
Jan. 1949	204.8	146.3

DATA: BUREAU OF LABOR STATISTICS, McGRAW-HILL DEPT. OF ECONOMICS

American Machinist INDEX OF METALWORKING PRODUCTION



INDEX		COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS. PORTATION EQUIP.	OTHER METAL-WORKING
Jan. 1949.....	220	241	230	229	300	154
Dec. 1948.....	224	249	235	225	309	156
Jan. 1948.....	227	248	242	236	294	156

AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1. Index figures are a percentage of 1939, which equals 100.

more furnace capacity should be at hand by summer. This should change the picture somewhat.

Turbine Backlogs Big

Heavy electrical machinery builders still have backlogs extending over two or more years. Turbine manufacturers report that they are well booked into 1951 and probably will be sold out for that entire year before long. This situation holds even with considerably enlarged capacity which will come into operation later this year.

The switchgear industry is doing very well. Its facilities will be fully engaged all year. Prospects are that it will go into 1950 with a comfortable pile of orders. Shipments of electric transformers in '49 will be substantially above those during 1947 and probably greater than the 1948 volume.

Orders for Motors Expand

There is a tendency among machinery makers to increase orders for small and medium-size motors. Inventories have been reduced to such a point that it now is feasible to expand a bit. Motor manufacturers thus are doing better than they were 30 days ago. It is likely that makers of fractional horsepower motors will step up their output soon and that the average production during the year will be higher than at present.

Companies specializing in electric controls say that sales this year probably will not be much under the 1948 total. Industrial heating units are selling better this year than last because of (1) greater availability of power, (2) cost-reduction and quality-improvement drive by metalworking managements, and (3) new designs put on the market recently.

Machine Tool Sales Better

Machine tool orders have been running ahead of the level during 1948. The jet engine program has been responsible for a small segment of this demand, with subcontractors as well as prime contractors furnishing some of the business.

Bookings for machine tools have originated in many metalworking lines. That is a healthy sign for the machine tool industry. Detroit is the worst spot; it is yielding very slim business. Domestic inquiries continue to be high in volume; and buyers continue to invite machine tool sellers into their plants in growing numbers to help them lick their cost-cutting problems.

ECA-financed machine tool orders are not yet impressive in volume, but still are large enough that they justify the belief that business from western Europe this year should be much improved over 1948. It is probable that machine tool shipments abroad this year will get back up close to the traditional 20% which prevailed in prewar days.

Steel Production High

The steel industry has been producing tonnage at a rate considerably in excess of last year. During the first two months of this year, output has been at an annual rate of more than 95 million tons.

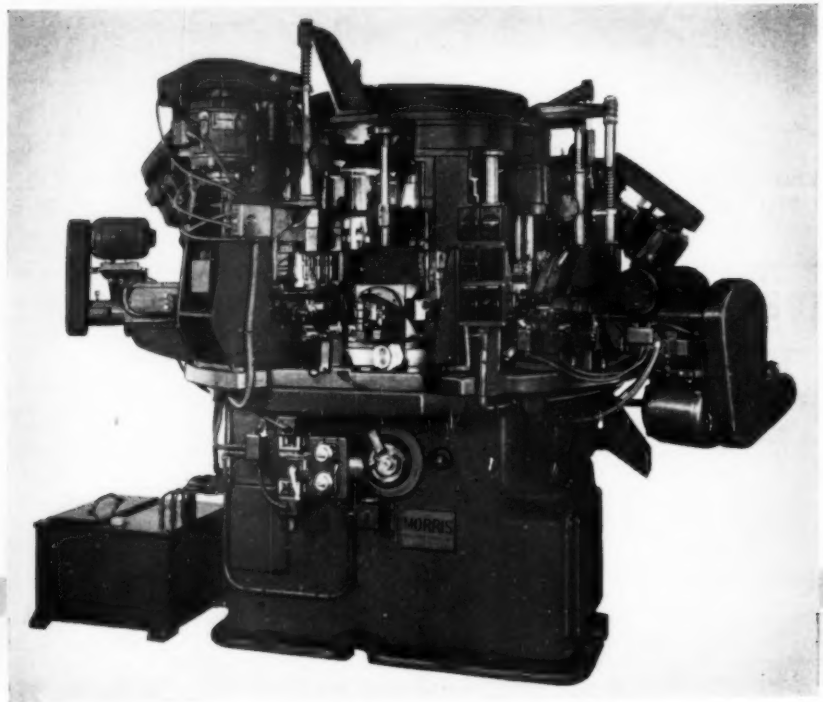
▶ Steel, other than sheet, strip and plate, has eased somewhat in demand, although the softness is not yet reflected in steel mill allotments for the second quarter. It is considered likely that large-tonnage users will be able to cut down their premium purchases during the second half of 1949.

The shortage in plates may persist for as long as another year if government allocations are kept at present levels or are increased as contemplated.

Carbon bars, alloy steels, structural steel, bar-size shapes, nails and wire are in fairly tight positions, but some improvement is just ahead.

Here's automatic production at its best-

MORRIS MOR-SPEED Production Machine



● On this machine the operator merely loads and unloads the work while machine is operating on the piece. All machine functions including the indexing are automatic.

The machine drills—taps—spot-faces—and reams carburetor main bodies on a mass production basis for a prominent automobile concern.

The machine of vertical design has 12 automatic indexing four position fixtures, 20 drilling spindles, 7 facing spindles, 15 tapping spindles, 1 brush spindle and 4 reaming spindles and turns out a completed piece at every index of the turret.

Here is another typical instance of where Morris developed the machine to meet specific job conditions. If you are interested in the high production of work requiring drilling, reaming, tapping, facing and similar operations consult Morris—they have the experience, engineering ability and facilities to help you.

Write for our Mor-Speed Production Machine Bulletin showing the wide scope of our operations with specialized equipment.

Builders of MOR-SPEED Line

The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

Unionization of Foremen

Management need not be apprehensive about unionization of foremen if foremen are treated as they should be.

Even if Congress should pass a new labor law which permits such unionization, there is nothing to fear provided management gives foremen the backing which rightfully is theirs.

Take the case of a prominent metalworking company. Its foremen are not merely "traffic cops." As the company's spokesman explains, "They are vital cogs in the managerial wheel."

They possess the right to "hire and fire" or to recommend such action. Any disciplinary measure toward rank-and-file workers must stem from the foremen. They also handle work assignments and promotions.

What is more, the foremen's salaries are substantially above the highest rate of workers under them. Whenever employees work overtime, their foremen get an extended work-week premium, which maintains the pay differential.

This company sees that its foremen get many considerations similar to those given to others in management.

Foremen, for instance, do not wear badges. They carry the same identification card as top management. They do not punch a clock. They receive three-weeks' vacation with pay. They are granted sick leave up to 48 work days in every calendar year.

They get separation pay and have special insurance privileges. They are given a preferred discount on the company's products.

Beyond these advantages, they are represented by men from their own ranks on the company's Executive-Supervisor Council. This council enables foremen to get a clear understanding of management's present policies and future plans.

The management conducts a training program which encourages the ambitious foreman to make the most of his abilities. Foremen are shown how they can do a better job and can improve their chances for promotion.

With this kind of program in operation, a union would have a slim chance of organizing this company's foremen. It would not matter much whether the law forbade or permitted it.

It was the absence of such programs during the 1930's and in the war days in many industries which gave unionization a chance to make inroads upon foremen's ranks.

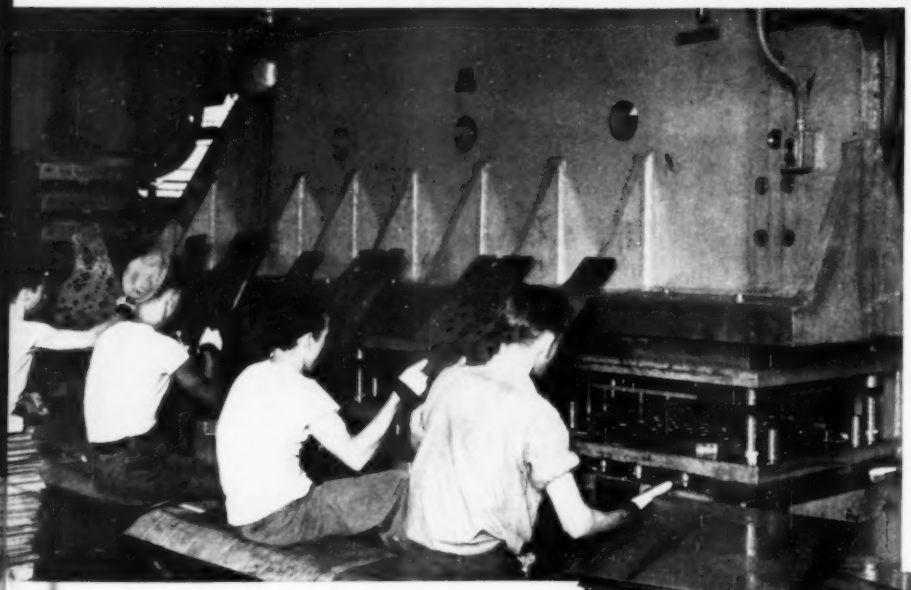
If foremen had been treated as well over the past fifteen years as many of them are treated now, if more companies had programs for their foremen similar to the one described, unionization would wither for lack of interest.

What are you doing to see that your foremen exercise a real managerial function and that they receive the privileges which go with such a status?

It is time to treat foremen in the manner to which they should be accustomed. Should you do that, you need not lie awake nights worrying about whether your foremen are going to be "union-joiners."

Burnham Finney

EDITOR



Passed from hand to hand, the work progresses from blank at right to completed part at extreme left. Two punching and notching and two forming operations are performed at each stroke of the press.

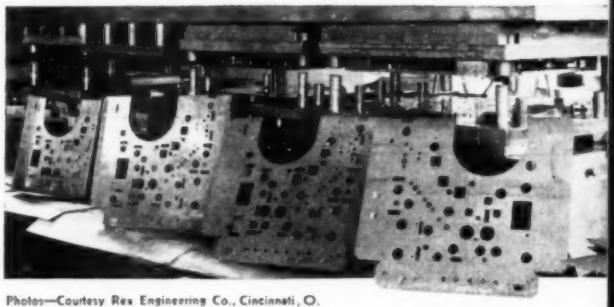
OPERATION TELEVISION...

This television chassis, a modern product made in the modern manner on a Cincinnati Press Brake, is produced from blank to completion in one stroke—four simultaneous operations on one machine.

281 holes, tabs and notches are punched, and three sides are formed at each stroke—to close tolerances.

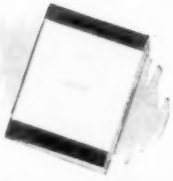
Cincinnati wide beds and rams—either fixed or detachable—for large area work, are highly productive on jobs of this kind.

You may find you can do it for less on a Cincinnati Press Brake.



Photos—Courtesy Rex Engineering Co., Cincinnati, O.

Write for technical Bulletin 125 a compact treatise on Press Brake practice, dies and applications.



THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

WENT THE DIGNITARIES...

. . . and when they did, the magnetic brake died, but the magnetic chuck was born.

Being the story of O. S. Walker and an idea

By E. J. Tangerman, Managing Editor

MANY AN INVENTOR has had his early model blow up in his face — witness Thomas Edison's chemistry experiment. But none has had his experiment come to a dramatic end because he spilled the leading townsmen on their faces—none, that is, except O. S. Walker.

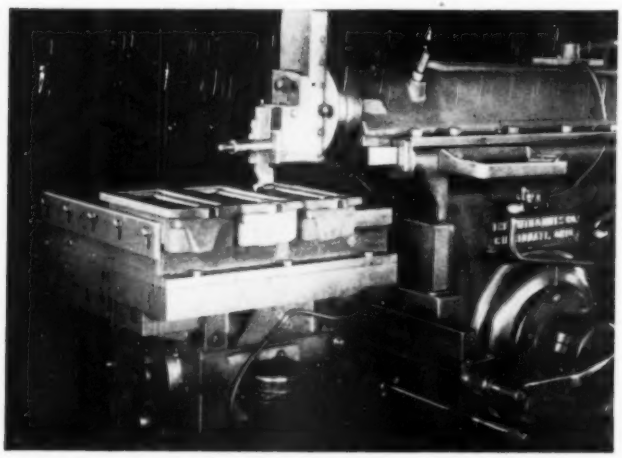
He told me the story several months ago, and still gets a reminiscent chuckle out of it after half a century. Mr. Walker has not been active in business since failing eyesight forced him to sell out thirty years ago, but he still has a well-equipped shop in his garage where he is working on several permanent-magnet chuck designs, entirely by feel.

His story is so typical of the struggles of inventors of fifty years ago that it should be put down in black and white. His indomitable will, that keeps him working at 91 in spite of tremendous physical handicaps, cannot help but offer inspiration to others.

The story goes thus: When Mr.

O. S. Walker in his office in 1912 or 1913. The incandescent lights are still supplemented by gas fixtures, and the latest in secretaries is at work. The telephone has its own table between them

Segmental Chuck . . . A 72-in. 6-station segmental magnetic chuck on a rotary-table surface grinder grips auto clutch spring plates for surfacing. Operation is continuous, the segments being magnetized and demagnetized automatically



Shaper Chuck . . . With a stop plate, an 18 x 24-in. electromagnetic chuck holds rough castings for machining on a shaper

Walker came to Worcester, Mass., in 1887, to work for Norton Emery Wheel Company as a designer and mechanic, he was already interested in electricity and magnetism. In the Worcester Public Library he found a treatise on electromagnetism which illustrated the tremendous power possible from simple electromagnets.

His first idea was to apply magnetism to braking the local electric streetcars. The small transit company that went through Barber's Crossing permitted him, after most eloquent arguments, to put the necessary coils inside the wheel hubs and install brake shoes on one old car. When it was completed, he extended an invitation to the civic fathers to test for themselves its added safety.

The preceding day, he briefed a competent motorman in operation of the new magnetic brakes and succeeded in teaching him to make smooth stops even on grades. But the morning of the test, his trained motorman checked in sick, so he was forced to use a substitute. The city fathers, in top hats and tailcoats, were already on hand, so with the briefest of instructions to the motorman, Mr. Walker invited his guests to take their seats and the car started toward town down a hill. With fingers crossed, Mr. Walker asked the dignitaries to stand in the aisle the better to feel the smoothness of the braking action—and signaled application of the brakes. The motorman disregarded instructions and applied full brake—and all the guests were catapulted to the floor.

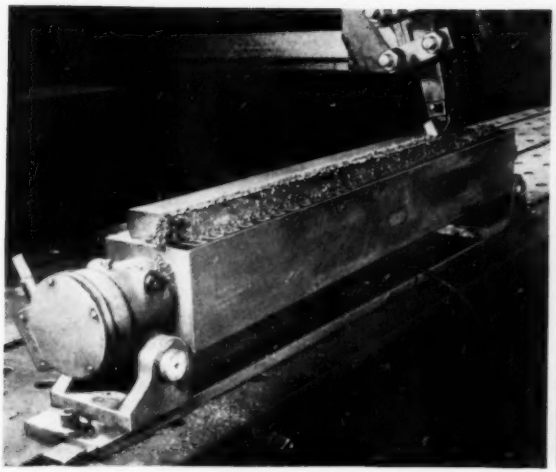
After top hats were recovered and dusted, the city fathers took their ruffled dignity away with them. The motor armature of the car was burned out, and so was the idea—so the magnetic brake was abandoned.

Brake to Chuck

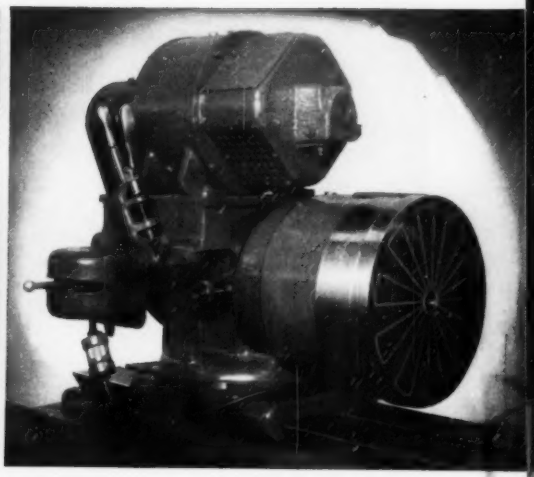
The way those brakes grabbed, however, suggested another application to Mr. Walker—as a chuck for machine tools. When Mr. Walker arrived in Worcester, he had had ideas for a grinding machine of his own design. These became the Worcester twist-drill grinder, the first model of which Mr. Walker built in the Washburn Shops of the Worcester Polytechnic Institute. Model and design were sold to the Washburn Shops for $800 and Mr. Walker soon after came to work for Norton Company to develop his patented universal cutter and tool grinder.

Among features of this machine was to be a surface-grinding attachment, and Mr. Walker conceived the idea of holding the work magnetically. He designed an oblong cast-iron base with a shallow recess for an insulated coil surrounding a horizontal central iron core. Over this he placed a faceplate to hold the work—in reality two interlocking plates separated by a non-magnetic substance, one resting on the positive pole and the other on the negative pole of the core and bolted to the base.

Interlocking elements covered the greater portion of the faceplate to extend the magnetic holding



Swiveling Chuck... A 6 x 6 x 50-in. swiveling chuck for a planer indicates the power developed by Mr. Walker's invention that revolutionized holding and clamping



Rotary Application... Modification produces this rotary chuck for a Landis grinder. The chuck is designed to hold thin circular pieces

power over a wide area. This design was duly patented by Mr. Walker, and while the chuck was of limited size, it was used for some years on the grinder for which it was designed.

This new idea in chucks worked successfully, so the young Mr. Walker took it to L. S. Starrett, of Athol, Mass., who was seeking some device to hold 6-in. steel scale blanks for finishing on the flat surfaces. After he was shown the features of the new magnetic device by means of offhand pencil sketches, Mr. Starrett contracted for a 6 x 40-in. chuck, which was made in due course at Norton Company. This was a cross-pole design for which Mr. Walker wound his own coils.

The unit was shipped to the Starrett Company for test. After a long period of uncertainty—not uncommon in those early days of pioneering new inventions—it was found that the chuck performed well. Thus, Mr. Walker's ingenuity and persistence were finally rewarded and an extremely important new workholding device was made available to the users of machine tools—particularly of grinding machines.

Mr. Walker finally resigned from Norton in 1897 to devote all his time to development of the chuck, and went back to the Washburn Shops, which was still making his drill grinder. In lieu of royalties, the Shops permitted him use of the machines and he went on building chucks. By 1900, he could start his own shop—on the third floor of the Porter Last Co. in Worcester. With A. W. Handy, who was only a silent partner with no authority, Mr. Walker made chucks and the old Brown & Sharpe No. 3 universal surface grinder. The latter then sold for $340. It was during this period that he was able to acquire a location in a Worcester suburb and there to build a shop of his own design. This was in 1910, and the original shop still stands.

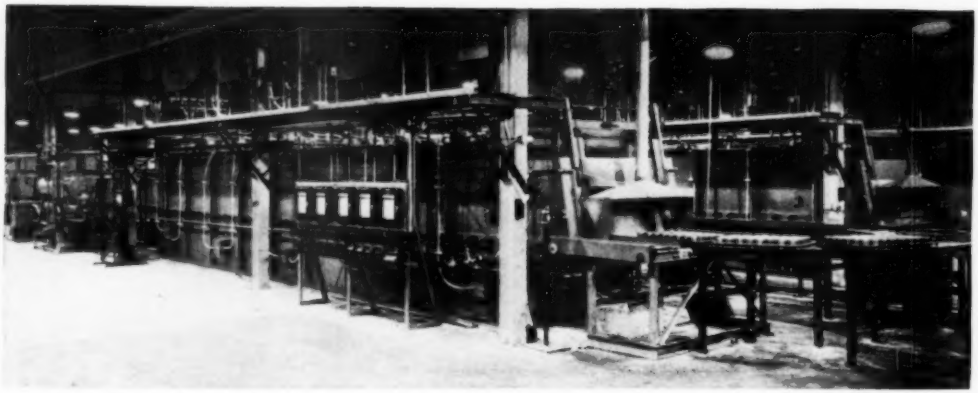
Ten years of this and the company was doing very well indeed.

". . . because of one man's interest in magnetism."

But the partners fell out, as partners will, and with William F. McCarthy, of the Henry Prentiss Co., New York and Boston machine-tool dealer, as go-between, Walker bought Handy out.

At the end of the first World War, declining health made it necessary for Mr. Walker to consider selling the business. Wm. F. McCarthy, C. O. Smith (who had just retired as machine sales manager of Norton), and Wm. B. McSkimmon of Athol, Mass., purchased it. After interim operation in Mr. McCarthy's name, Mr. McSkimmon became president, Mr. Smith secretary, treasurer and manager, and Mr. McCarthy a director. When Mr. Smith passed away some years ago, J. J. Ladden succeeded to the management.

Thus, from Mr. Walker's original idea has come a great number of variations, including rectangular, swiveling rotary and special chucks incorporating a variety of coil types—even permanent-magnet units with three bands of magnets (when the center band is reversed by a lever, the opposed poles release work on the chuck). They go on benches, on any machine tool, on other machines. They are common in the world's shops today—because of one man's interest in magnetism.



Temperature and Process-Timing Controls . . Automatic instruments maintain product quality, enable maximum output of heat-treating furnaces of various sizes. This installation at Briggs Mfg. Co. copper brazes steel subassemblies at 2050 F, but is recycled quickly when work is to be bright annealed at lower temperatures

WHAT'S INSIDE TEMPERATURE CONTROLS?

PART 1: Temperature control and timing are vital to good heat-treating. This two-part article tells about systems for temperature measurement and why electronic controllers help the small as well as large shops

BY DAVID FIDELMAN, Electronic Consulting Service, N. Y. C.

WITH modern heat-treating furnaces and processes, precise methods are required for measuring temperature and controlling the operations of the heating equipment. This problem has been solved by introduction of electronic instrumentation, which makes possible extremely precise regulation of temperature and heating time, according to the exact needs of the process.

Importance of adequate control equipment is this: Modern heat-treating must be done to rigid specifications for quality, cost, and speed of production. In general, two of the most important factors in any heat-treating process are the temperature at which the object is kept, and the length of time the object is kept at this temperature. In many processes, several different temperatures may be involved, for varying lengths of time.

Methods for accurate measurement of high temperatures have been known and used for some time. But these methods are extremely critical, require delicate and sensitive instruments that can be used only by laboratory experts and certainly not for production measurements or control. Introduction of electronic circuits has, however, made it possible to use these same techniques for measuring temperatures with great accuracy under production conditions.

Today, many precision temperature controls make use of electronic circuits in their operation. Electronic techniques also make it possible to use simple and reliable equipment for completely automatic control of the heating process, according to the result of the temperature measurement. Such control equipment may be used in connection with almost all of the various types of heating and cooling equipment currently in use.

Four methods of temperature measurement are in general use at present:

1. The expansion thermometer
2. The resistance thermometer
3. The thermocouple
4. The radiation pyrometer

The choice of which type to use for a specific application depends primarily upon the temperature range to be measured. All four types are available in commercial units that are reliable, accurate, sensitive, and are at the same time sturdy enough for general use in a manufacturing plant.

A clear understanding of the principle of operation and characteristics of these four types of temperature measurement methods will aid in the intelligent selection of the one best suited to a specific temperature control problem.

1. *The expansion thermometer.* This simple and most common method of measuring temperature

makes use of the fact that almost all materials expand with an increase in temperature. Probably the best-known example is the liquid thermometer, using mercury or alcohol in a calibrated glass tube. The bimetallic-strip thermostat is another well-known application of this principle, making use of the fact that different metals have different rates of temperature expansion. Thus, a strip made of two different metals, fastened securely together, will bend considerably as the temperature changes.

Resistance Thermometer

2. *The resistance thermometer.* All materials resist the flow of electrical current. This resistance changes with the temperature, and varies for different materials. Therefore, by using a material with a high temperature coefficient of resistance, the temperature may be measured by measuring the resistance of the materials. Many different types of materials may be used for this purpose, the most common being platinum, nickel, copper, phosphor bronze, and certain organic liquids having high temperature coefficients. Platinum resistance thermometers have been used over the temperature range from —430 F to 2000 F with an accuracy of the order of 0.08 to 0.6 F at the low and high temperatures in this range.

3. *The thermocouple.* A thermocouple consists of a circuit of two dissimilar metals and has the property that a voltage is produced when the junctions are at different temperatures. The voltage developed by thermocouples used for measuring temperature is usually from 1 to 4 millivolts for a 100 F temperature difference between junctions.

4. *The radiation pyrometer.* The radiation pyrometer is the most suitable method of measuring high temperatures. Its operation is based upon the fact that radiant energy emitted by an object increases with temperature. Thus, the temperature of an object may be measured by determining the amount of radiant energy which it emits. The amount of radiant energy may be determined quantitatively by either a thermocouple or a photoelectric cell. There is no upper limit to the temperature which can be measured by pyrometers, while the lower limit may be as low as about 200 F, depending upon the design of the instrument.

Characteristics

These four types of temperature measuring instruments have different characteristics, which will, in general, make one better than the other for a specific application. Thus, the expansion thermometer (the bi-metallic thermostat, in particular) may be used in applications where heat-capacity of the furnace is high, or where high precision is not required. In such cases, this type of thermometer can often be used as the basis for the simplest and cheapest solution of a temperature-control problem.

Where continuous variation of temperature is required for precision control, the last three types of thermometers must be used, with the proper type of indicating and control equipment. The resistance thermometer and thermocouple are suitable for low temperatures, and can be used to measure temperatures as low as —400 F. But, in using the thermocouple to measure temperatures not far from room temperature, the exact temperature of the other junctions must be taken into account, because the voltage depends upon the *temperature difference* between the junctions.

Either the resistance thermometer or the thermocouple may also be used in furnaces operating at temperatures up to about 2000 F. For higher temperatures the radiation pyrometer must be employed. The main factor to be considered in selecting the proper type of thermometer for use in a specific application is that the important range of temperatures should be adequately covered by the type selected.

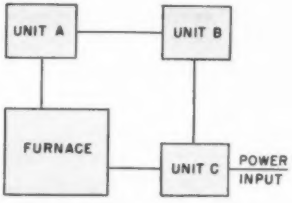


Fig. 1—Basic elements of a temperature control system using a direct measuring control element like a thermostat are: Unit *A* for temperature measurement and control; Unit *B* which is an auxiliary relay, and Unit *C*, which is a temperature controller operating an electrical heater or a driving motor for a fuel valve

In temperature measurement, the amount of energy delivered by the thermometer for measurement or control purposes is very low. When a bimetallic-strip thermostat is used as the primary control element, it should be used with an auxiliary relay in order to keep excessive currents from the thermostat contacts. The control currents can then be switched by the relay contacts which are designed for high currents.

Non-electronic systems for use with thermometers of Types 2, 3 and 4 are extremely delicate, and are therefore unsuitable for production measurement and control purposes. On the other hand, the characteristics of electronic circuits are suited to precisely this type of service. When electronic methods are used in conjunction with these methods of measurement, the result is an instrument which may be used for accurate and reliable service under almost any production condition.

The main reason for this situation is that electronic circuits require an extremely small amount of energy to control their operation, but are able to amplify this energy many millions of times in order to operate and control equipment that requires large amounts of energy. Thus, the output from the temperature-measuring devices can be amplified electronically and then used in conjunction with the more sturdy types of measuring instruments or control systems.

Automatic Control Systems

The most simple type of automatic temperature control, Fig. 1, makes use of a mechanical thermostat and an electrical relay to give direct control of furnace temperature. This method gives two-position control action, consisting of: (1) increased heating power when the temperature is too low, and

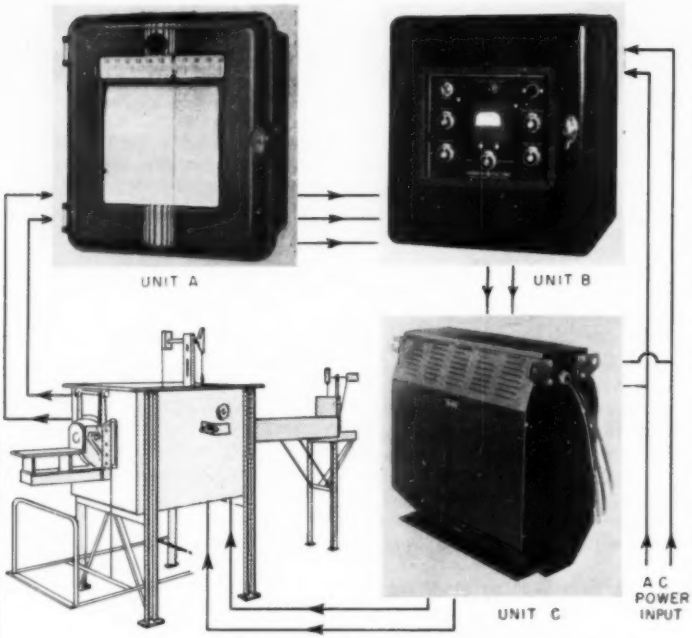


Fig. 2—Introduction of an electronic controller into the basic control arrangement produces an automatic heat-treating system. Unit *A* indicates temperature, supplies a weak voltage to Unit *B*, which is the electronic controller. Unit B amplifies this current, supplies dc to the saturating winding of Unit C. The ac power input to the furnace is regulated by the saturable-core reactor, Unit *C*, according to the control current flowing in its dc winding.

(2) reduced power when the temperature is too high. This system is completely adequate in many applications. However, in many cases it cannot be used, either because electrical arcing at the contacts cannot be tolerated, or because greater precision is required.

For more precise, continuously variable temperature control, the electronic system shown in Fig. 2 must be used. It consists essentially of:

(a) The thermometric element, which may be any of the different types which have been described above;

(b) The electronic amplifying circuit, which is required to raise the amount of energy supplied by the measuring element to a level sufficient for control and measurement purposes;

(c) The electronic control circuit, which controls the amount of power applied to the heating system. This circuit contains the temperature setting and controlling mechanisms, together with any automatic compensating systems, such as line voltage compensators and droop correctors;

(d) The temperature controlling element, such as a saturable-core reactor to control an electrical heater, or a driving motor or valve operating device.

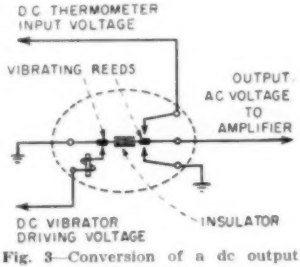


Fig. 3—Conversion of a dc output from a thermometer to ac for use by an amplifier can be accomplished by a vibrator

(e) The furnace.

An automatic temperature control system of this type may be arranged for use with almost any existing type of heat-treating system. The application of such controls will be described specifically with reference to their use in furnaces and heat-treating, but it should be noted that these descriptions apply equally well to other forms of temperature control such as cooling and high-frequency heating.

Generally, the addition of the first three elements described above will be required to produce an automatic temperature control system, and it may in some cases be necessary to change the furnace temperature controller (i.e., the valve, or electrical current control, etc.) in order to make it suitable for automatic operation. The required additions and changes will not be difficult in most cases. Many modern heat-treating units can be purchased equipped with provisions for automatic control.

Electronic Temperature Control

The basic principles of operation of electronic temperature controls may be understood without specialized knowledge of electronics. The electronic amplifier circuit, which is used for increasing the amount of energy furnished by the temperature-measuring element to a level that will operate the temperature controls, is similar in principle and details to amplifiers used in all other electronic applications.

The three types of temperature-measuring elements may all be connected into electrical circuits in a manner such that they deliver energy in the form of dc voltage, which may then be amplified. This voltage can be amplified by a dc amplifier or converted into ac by an electromechanical interrupter and amplified by an ac amplifier. In general, the latter procedure is more widely used since ac amplifiers are simple in design and stable over long periods of time. A simple arrangement for converting dc to ac for this type of service is shown in Fig. 3. The ac output of the amplifier can be converted back again to dc, if necessary, by use of another set of contacts on the same vibrator.

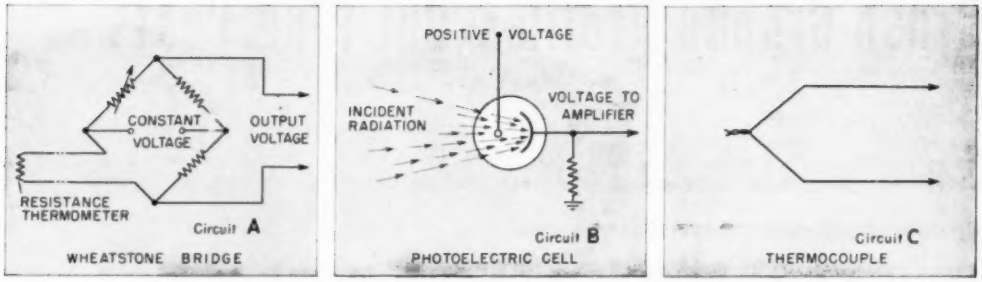


Fig. 4—These electrical circuits show how various types of thermometers can be connected to give a temperature reading in terms of voltage, which in turn is fed into an electronic amplifier: Circuit A—Resistance thermometer connected into one leg of Wheatstone bridge. Variation in furnace temperature unbalances the bridge and process corresponding voltage change in output voltage. Circuit B—A photoelectric cell can be connected to serve as a radiation pyrometer. Incident radiation is proportional to temperature, is converted to voltage and fed to the electronic amplifier Circuit C—A thermocouple generates dc voltage proportional to the temperature of the junction, and this voltage is supplied to the electronic amplifier

The electrical circuits in which the thermometric elements are connected so that their temperature reading is in the form of voltage are shown in Fig. 4:

(a) Circuit connections for the resistance thermometer are shown in Fig. 4 *a*. Since a resistor cannot generate a voltage by itself, the thermometer resistance is inserted in one section of a resistance (Wheatstone bridge) circuit whose other resistances are chosen so that there is no voltage at the desired temperature. Then, when the temperature goes up or down, the resistance of the thermometer changes and the circuit produces a voltage which will correspond to the change in temperature.

(b) The photoelectric cell is connected through a resistance to a source of voltage as shown in Fig. 4 *b*. As the amount of radiation falling upon the cell changes, the current through the cell changes correspondingly. The result is a voltage which is proportional to the temperature of the object upon which the cell is being sighted.

(c) The thermocouple by itself creates a voltage which is proportional to the temperature. Therefore its voltage may be used directly, as shown in Fig 4 *c*.

In any case, the voltage produced, after amplification, controls operation of the heating system.

Part II of Mr. Fidelman's article will appear in an early number.

THE ARTIST

BY GEORGE W. KEATING

He's not much concerned about brushes
A canvas to him is a cloth
He won't go for sweet-singing thrushes
Nor thrill at a brilliant-hued moth.
But give him a jig or a fixture
To fashion from prints that portray
He'll finish a practical "picture"
That man is an artist, I say.
With height-gage, a square and protractor
A "mike", a steel rule and sine bar
He'll shame a Shakespearian actor
And smother a grand opera star.
With delicate care and precision
That none but the gifted bespeak
He'll cautiously make an incision
That calls for a surgeon's technique
With passion for accurate spacing
He'll shape the most intricate die
No braggart; in fact, self-effacing
A genius, but still a real guy.
Then hail to the toolmaker's magic
And the part he takes in life's play
Without him our lot would be tragic
That man is an artist, I say.

"He likes to feel he's doing his bit to increase production"

Crush-Ground Profiles Cut Plug Costs

Switchboard plugs once required hand-made tools—but no more. Crush grinding reduces tool costs 50% and more, improves quality, and gives longer tool life between grinds

BY C. D. CAULTON & J. E. SAFHILL

Tool Designers, Ericsson Telephones Ltd., Nottingham, England

NEW methods of tool manufacture in the production of switchboard plugs at Ericsson Telephones Ltd., Nottingham, England, have resulted in improved quality, increased quantity, longer tool life, and reduced costs. Form tools for obtaining the profile on plugs were previously rough-milled and finished laboriously by hand, being checked to a master plug. In addition to this, warping of the steel in hardening necessitated a stoning operation to correct the form.

Crush-form grinding is now employed. The form is ground on the HSS crushing-roller blank on a No. 13 B & S form-tool grinder. This form is then transferred to a grinding wheel (e. g. Norton 18BE) on a simple fixture. All grinding operations are performed on a hand-operated surface grinder, for this reason crushing precedes grinding on the same machine.

The crush roller is mounted on the end of a magnetic chuck, absolutely parallel to the face of the grinding wheel. While the wheel is being rotated by hand or a low-geared motor, the crush roller is fed slowly into it until the form is reproduced. Grinding dust is removed by a compressed-air line and a standard dust extractor.

Profile tools are located on the magnetic chuck by means of a ground location bar (permanently fixed), and spacing plates, which vary in width, depending on the particular profile to be produced. An easily detachable cover covers the roller during grinding.

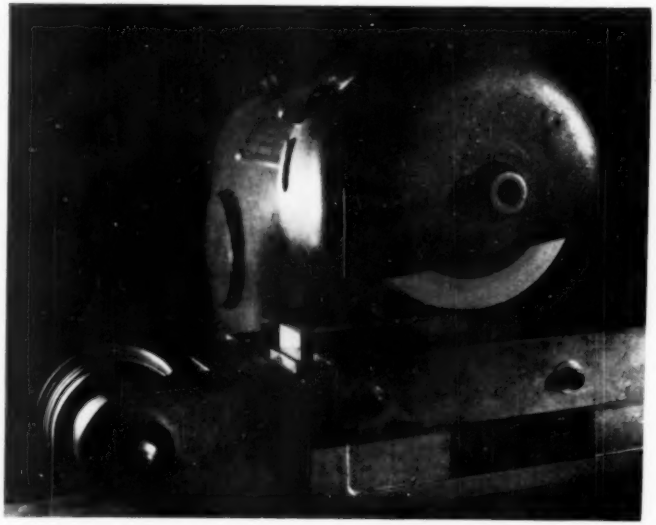
Six large plug shearing tools can be ground after one crushing. A finishing wheel is then crushed and the same six tools are finish-ground to fine limits. Small shaving tools or profile plates are mounted in batches of 6, and 72 tools can be ground from one crushing. Crush rollers are re-cut after completion of approximately 24 large profile tools, or 288 small shaving tools, the depth of the form being the deciding factor in the wear of the roller.

Step pieces for insertion in the plug for molding purposes require slightly different treatment. Blanks are mass produced, and drilled in quantity. They are then hardened, centerless-ground, and thread-ground, prior to crush forming.

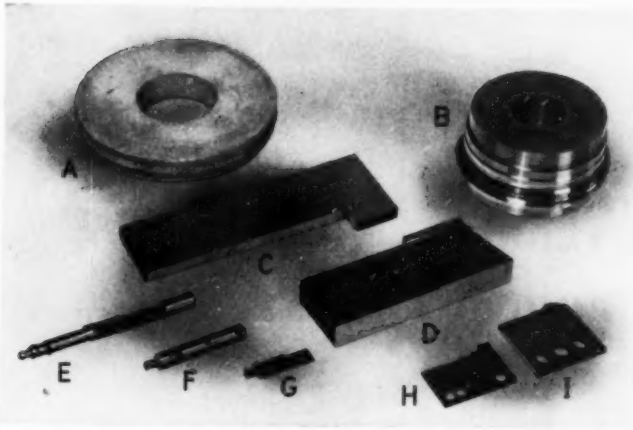
A fixture mounted on the magnetic chuck holds six step-piece blanks, locating them by means of ground pins. The steps are ground first, the method of producing the form on the wheel being identical with that for the profile tools. The radius is obtained by mounting the step-pieces in pairs end-to-end in a small fixture, and the grinding wheel is passed over them in a longitudinal direction.

A similar fixture is used to complete the operations, but this has a slight taper (3°) in each direction, to give required backing off.

In all crushing operations, it has been found advisable to rough-grind tools at one setting, and finish-grind with a different, newly crushed wheel (e.g. Norton



Roller and Grinding Are in Line—After crush dressing on the roller at left, the wheel grinds the shearing tool positioned by a step plate



Tools and Product—Wheel *A* is formed by crush roller *B* to grind shearing tool *D*, profile plate *H* and shaving tool *I* with spacing plates like that at *C*. They produce switchboard plugs *E* and step pieces (blank at *F*, finished piece at *G*)

19100L). The only exception is the final operation on step-pieces, which can easily be finished at one pass, because of the light cut.

Crush roller, profile tools, and shaving tools are all checked against a 25:1 profile drawing on a Dekkor optical projector, and are accurate to within 0.0002 in.

All-round improvement has been obtained since reverting to crush-grinding. The quality of the finished plug is now far in advance of anything previously obtained. Production has been increased, and tools last longer between grinds, which, of course, reduces tool setting and operating costs. In addition to this, the actual manufacturing cost of the profile tools has been reduced by nearly 50% and the cost of step-pieces by nearly 60%.

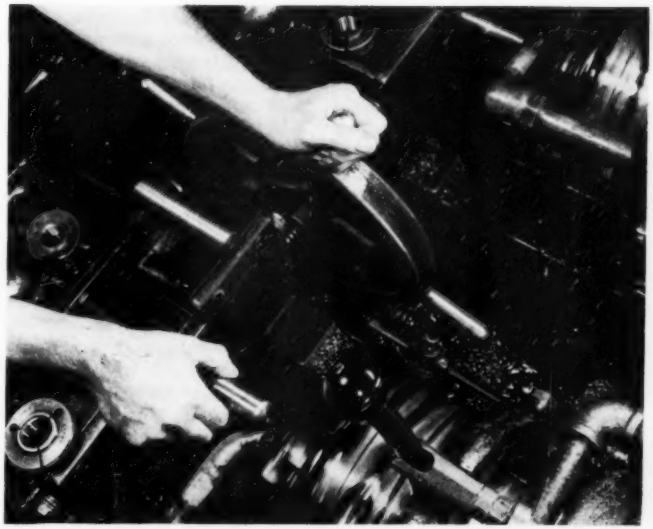
Treated Carbon Steel Substituted for Alloy in Studs

LARGE SAVINGS by the manufacturers of screw-machine products are a possibility, judging by the experience of Lundberg Screw Products Co., Lansing, Mich. Where customer specifications permit, they have substituted cold-finished carbon steel, heat-treated by special induction equipment, for the more expensive chrome-molybdenum and chrome-nickel-molybdenum alloys.

Employed in the manufacture of certain studs for automotive and farm machinery, the substitution has eliminated heat-treating after machining. This results in studs of greater uniformity and smoother finish combined with a lower operating cost.

The cold-finished bars are Electreat, which is supplied in full-length, heat-treated bars by the Jones & Laughlin Steel Corp., Pittsburgh 30, Pa.

The former method was to machine the studs from alloy steel, then heat-treat by neutral salt-pot hardening, oil quench and tempering to produce the desired properties. Tests indicated that the cheaper Electreat would meet the physical specifications for some studs. In the applications where substitution was possible, Lundberg is said to be obtaining a higher quality product at lower costs.

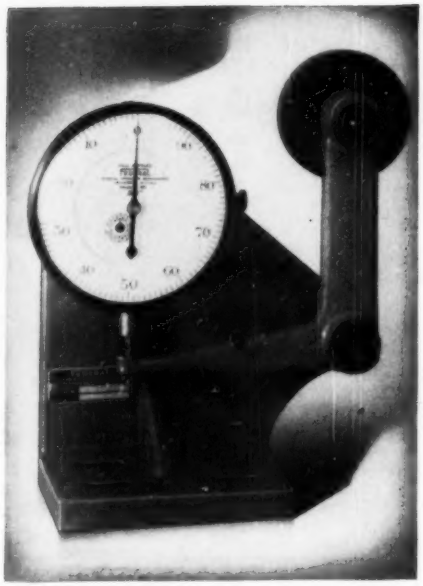


Stud cut from Electreat steel is inserted in a Landis two-spindle threader. Above this is a stud with both ends threaded

CONTINUOUS GAGING DETERMINES AVERAGE STOCK THICKNESS

By overlooking local bumps and surface depressions in moving sheet stock, continuous gages indicate average thickness and trends in dimensional changes

BY A. C. SANFORD, Engineering Dept
FEDERAL PRODUCTS CORP., PROVIDENCE, R. I.



Single-roller gage is used when stock can be passed over an accurate reference surface such as a ground roller or platen. Roller on gage bears against one side of the stock while the other side is in contact with the reference surface

MEASUREMENT of continuously formed material such as sheet, strip, rod or wire poses many interesting problems. Contrary to generally held opinions, it is not possible to hold a micrometer or simple indicator and roller assembly in contact with moving material and obtain an accurate measurement either of size or of the size-change trend.

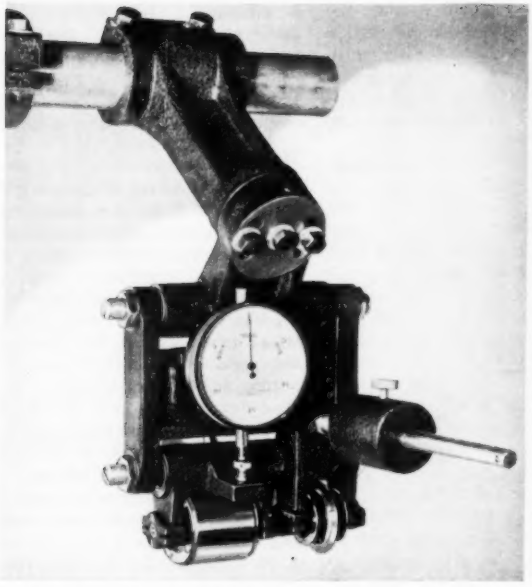
While most material which is being formed continuously may give the superficial impression of being quite smooth, it is actually full of local bumps and depressions. Paper, for example, while appearing to be quite smooth, is actually a series of bumps held together by a binder. Rubber and plastic-type materials tend to be wavy, with the waves reflecting the runout and variations in the calender rolls, plus variations in the flow of material through the rolls. On coated wire, the covering tends to conform to the contour of the core. Especially when the core is stranded, the OD varies greatly along the length of the run. Other materials have similar characteristics. Experience has shown that when a sensitive measuring instrument is used, all continuously formed materials show these variations.

In many instances, these purely local bumps and depressions will exceed the allowable variation for the average thickness of the material. When measuring is done continuously with a micrometer or fixed-anvil type gage, the high spots only are measured. It is obviously not sensible to measure the thickness of the material over these bumps and then call that measurement the average thickness of the material.

On the other hand, if a sensitive measuring instrument is used which is fast enough to show all variations in the size of the material, the instrument will give a high reading when it measures a bump, and a low reading when it measures a thin spot. Because the bumps come frequently, the indicating hand is in a constant state of movement or vibration. This makes it extremely difficult for the operator to determine the average size of the material at any given moment. In most continuous manufacturing processes, it is not possible to eliminate these local variations and they do not seriously affect the finished quality of the material.

The problem, therefore, becomes one of overlooking these bumps or thin spots and reading only the average thickness. Because of the local variations, a damped indicating device which will overlook the extreme highs and lows, and give an indication of the average size of the stock only, is necessary on most applications. Such a device should be considered as an indicator of averages, or trends in average thickness, rather than an indicator of the actual thickness of the stock at any given point. When used as a trend-indicating device, the continuous-measuring gage serves the function of informing the operator as the stock becomes heavier or lighter, and notifying him of the necessity of making machine adjustments.

There are two basic types of continuous-measuring gages. The



Sheet-stock measurements can be made as material passes over a calender roll by the use of a differential-roller gage in which a cylindrical roller rides on the stock and a barrel-shaped roller rides on the calender roll

Double-roller gage carries its own reference roll as well as a measuring roll and is particularly suited to such operations as gaging the thickness of wet paper stock before it enters the calender rolls

first type makes a physical contact by means of rollers or fixed anvils, with the material to be measured, and the indicating device actually measures the displacement of the contacting roll or anvil. The second, and less common, is the non-contact type. The air gage is an example of this type and is applicable to certain forms of material. In this article the contact type of gage only will be considered, although many of the problems also apply to the non-contact type.

Further to simplify the discussion, suppose the contact type of gage to be divided into two basic and necessary parts; first, that portion which actually touches the material to be measured; second, that portion which measures the displacement of the contact. The first part can be called the contactor, and the second part the indicating device.

The contactor may have any one of several different forms. One of the simplest types is the single-roller device mounted at some point where the stock to be measured passes over a reliable reference surface which may take the form of an accurately ground roller, or platen. The single roller then rides on the top of the stock while the stock is in contact with the reference surface. Individual single-roller gages have been used succesfully on the production of sheet material such as rubber. Multiple installation with as many as five gages across the width of the stock have been used, for example, in the manufacture of glass.

Differential Roller Gages

In some types of sheet-stock manufacturing processes it is necessary, because of space limitations, to measure the material as is passes over one of the calender rolls. For applications such as this a differential-roller type gage is suitable, wherein the gage is equipped with one cylindrical roller which rides on the material and a barrel-shaped roller which rides on the calender roll. By measuring the difference in the position of these two rolls, the stock thickness is obtained and the influence of calender roll runout is minimized. This type of gage has generally been used in pairs, mounted directly against the calender rolls.

In the manufacture of heavier papers, it is desirable to measure the thickness of the still damp stock after it leaves the wet end of the machine but before it enters the calender rolls. Because of the width of the stock, it is not possible to grind a single wide roll with sufficient accuracy to serve as a suitable reference for a single-roller gage. For applications such as this, where the material is quite flexible and the pass line comparatively fixed, the simple two-roll type gage which carries its own reference as well as measuring roll can be used.

Where comparatively inflexible material must be measured, the more elaborate and sturdy floating-type gage is suitable. This gage has its measuring device mounted on a floating unit which permits it to follow variations in the pass line of the material and still keep the reference roll in contact with the underside of the material. For example, the floating

gage has been used to measure centerless-ground steel rods 20 ft long. In this application the gage was mounted on a handling fixture and the 20-ft-long rods passed through the gage by power-driven rollers. The floating feature enables the gage reference roll to remain in contact with the underside of the rods, although the rods are not always perfectly straight. The operator watches the signal lights and rejects pieces which are beyond the 0.0005-in. tolerance.

Thus far, a few of the possible types of contactors have been discussed. While these are basic types, many others can be made to suit physical limitations of the job. Regardless of the type of contactor which is chosen for the particular job, there are three types of indicating devices available. Each has its advantages and limitations.

Indicating Devices

The simplest type of indicating device is a dial indicator. A second, and more versatile indicating device, is the dial indicator combined with an Electricator. The Electricator is an electrical switching device fastened to the back of a dial indicator and designed to give electrical impulses when the indicator hand reaches certain high and low limits. The third device is electronic in nature and gives a steady meter reading, operates signal lights, and can also operate a recorder.

The dial indicator is a mechanical device for amplifying the movement of the contactor and making it visible on a dial. Because the magnification is mechanical, the indicating hand will continually attempt to follow the movement of the contactor roll. If the material is at all bumpy, or if it moves at a fairly rapid rate, the effect will be to keep the indicator hand in constant vibration. This may make it difficult for the operator to determine the exact size of the stock at any given moment. The dial indicator, as applied to continuous measurement, is, therefore, primarily suited for slow-moving, smooth material. When an indicator is the measuring device, determination of size depends on the operator's ability to estimate the average reading.

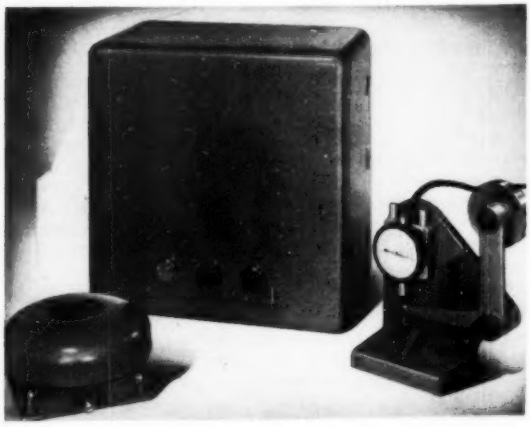
When the Electrilator, or other switching device, is combined with a dial indicator, many materials can be measured which could not be measured by means of the indicator alone. With the Electricator, the indicator hand will, of course, still fluctuate, but the limit lights can be slowed down by adding an electrical time delay.

Time Delays

This time delay, or damping, is arranged in such a manner that the limit lights, either oversize or undersize, will not flash unless an oversize or undersize condition occurs, and is sustained for a few seconds. All bumps or low spots which take less than the time delay period to pass the gage are automatically overlooked. The time-delay period can be made adjustable from instantaneous for fast-moving stock, to a practical limit of approximately 100 sec for extremely slow-moving stock. Therefore, if a steady meter reading is not necessary and the operation of signal lights for oversize and undersize is satisfactory, the Electricator is a suitable indicator for continuous measuring.

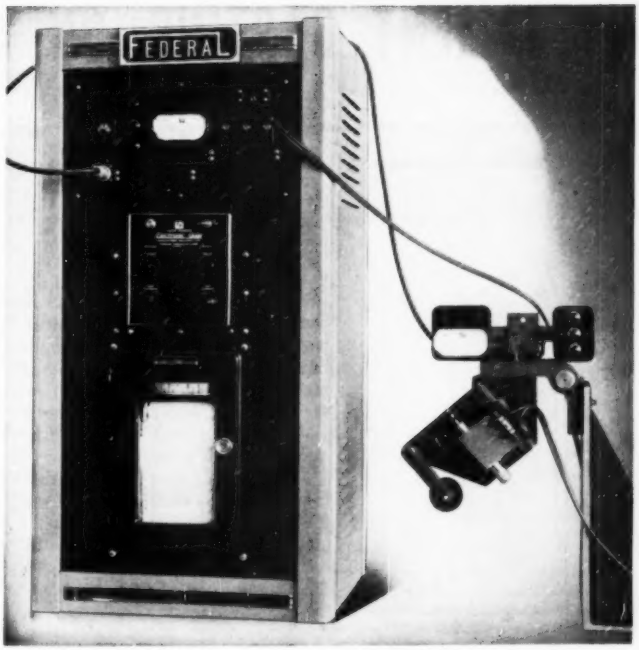
The third method of indicating size variation is by an electronic device. This indicator, although somewhat more expensive than the others, is considerably more

← **Floating-type gage** permits the gaging head to follow variations in the pass line of the work while keeping the reference roll in contact with the underside. It is applicable to such work as measuring rods which are not perfectly straight



Electricator attached to the back of a standard dial indicator and coupled to a power unit will operate a signal bell and warning lights when stock exceeds established limits for more than a predetermined time period

versatile. It can be arranged with the time delay in both the meter and light circuits. Because the meter is damped, as well as the lights, it gives a steady size indication. It is, therefore, possible to take a meter reading at any given moment and determine the average size of the stock, and still have the signal lights which will serve to give notice when the stock is running oversize or undersize. In addition to having a steady meter and light signals, the electronic gage is the only one of the three types of indicating devices available which can be used to provide a permanent record of any run on a recorder.



Electronic unit coupled to single-roller gage has time delay in both meter and warning light circuits. This gives steady meter readings to determine average stock sizes at any time, and can provide a permanent chart record

Precision Gaging

The electronic measuring device has solved one very vexing problem and simplified another by permitting a new concept of continuous-measuring methods. It is almost impossible and certainly prohibitively expensive to try to make a pair of free running rollers with a combined runout of less than 0.0001 in. In the past there has been a feeling that, as this error would be reflected in the gage, it would be impossible to measure stock where the tolerance was 0.0002 to 0.0001 in.

This would hold true, because the runout of the rollers, especially after a period of use, would at least equal, if not exceed, the tolerance on the material to be measured. By applying the electronic indicating device and a new concept of measurement, it is now possible to measure stock and indicate size variations on the order of a few millionths, despite roller runout which may far exceed the tolerance of the material.

This new concept may be explained thus: If a damped meter is used which takes perhaps two to three seconds to reach equilibrium at a given reading, the meter will overlook any oversize or undersize signal which lasts for less than the damping period. With average-speed material, a pair of contact rollers will probably turn over at least three or four times a second. The effect of runout of the rollers at each revolution will be overlooked by the gage and the meter will see only the average roundness of the roller and the average size of the stock.

It is hard to believe, but true, that in actual tests a pair of rollers which had a combined runout of 0.0007 in. could show variations of 0.00002 in. in the thickness of the stock being measured. When a device such as this is used, the gage is not set to zero with gage blocks, since the roller runout would introduce an error. The gage is set with the actual stock moving through it. The moving stock is then measured by conventional methods and the gage meter set to agree. The gage will then show the trend of the stock as it gets thicker or thinner and will operate signal lights and a recorder.

Compressible Materials

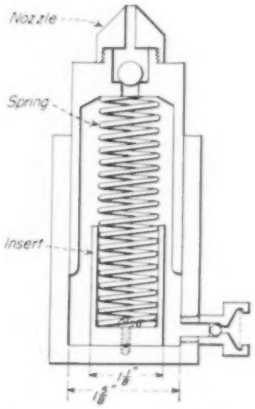
Most compressible materials are measured according to standards set up by the ASMT or TAPPI. It is a physical impossibility to duplicate these measurements exactly while checking the stock continuously. On applications such as this, the concept of a trend-measuring device is especially valuable. The material is run, the size is measured according to accepted standards, and the continuous-measuring gage is set to conform to the measurement obtained. It will then show variations in the average size of the stock as the run progresses. Using this concept of trend rather than actual thickness measurement, therefore, opens new fields for continuous measurement. Many of the problems to which this principle has been applied were heretofore considered impractical of solution.

One of the new fields which is being explored is the automatic control of the machine producing material continuously. As yet there has not been time for widespread applications of continuous measurement to machine control, but experimental installations lead to the belief that many machines will be controlled automatically in the forseeable future.

INVESTMENT CASTING ON A SHOESTRING

Four essential equipment units—wax injector, centrifuge, furnace and oven—cost under $1,000. Here, Mr. Thompson tells how to make and use them

BY K. W. THOMPSON, K. W. THOMPSON TOOL COMPANY, Franklin Square, N. Y.



Wax Injector—This simple model is of the plunger type, in which the mold presses against the nozzle to force wax into the mold cavity. The water jacket is not shown. The insert reduces area to increase injection pressure or reduce wax volume when necessary

PRECISION investment casting is a comparatively new method of casting, particularly for industrial parts. As is to be expected, changes in equipment are constantly being made as casting houses learn better ways of applying the basic principles. No two will use the same methods or equipment.

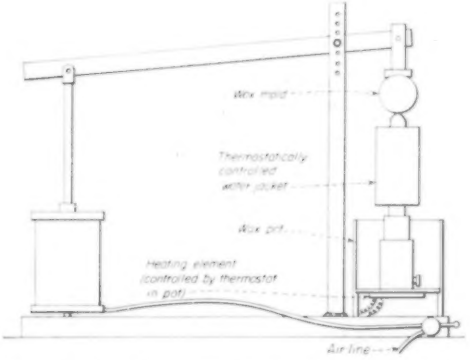
Much has been written regarding the various phases of precision investment casting, but these articles deal primarily with the methods of the larger companies who have spent many thousands of dollars on equipment, giving the impression that only by large expenditures for equipment is it possible or profitable to use this manufacturing method.

Many firms need a precision casting department, but are scared off in the belief that it would cost much to set one up. We built our own equipment—not for the purpose of saving money, however, but because the features we were looking for were not available on the market. The cost of making the four essential parts—wax injector, centrifuge, furnace and oven—was under $1,000.

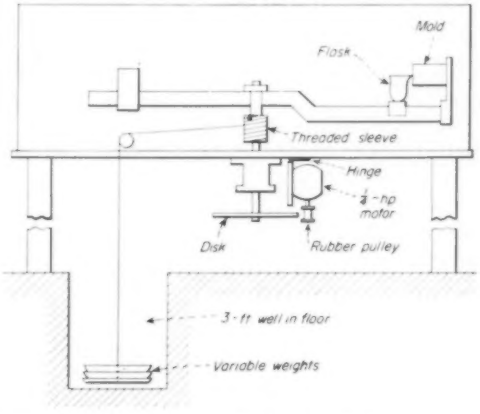
The making of accurate waxes is the most difficult phase of the business. Certainly the finished casting can be no more accurate than the wax it replaces.

The ideal wax injecting machine is one which injects wax into a mold at the lowest practical wax temperature, thus reducing to a minimum the shrinkage that takes place when the wax solidifies.

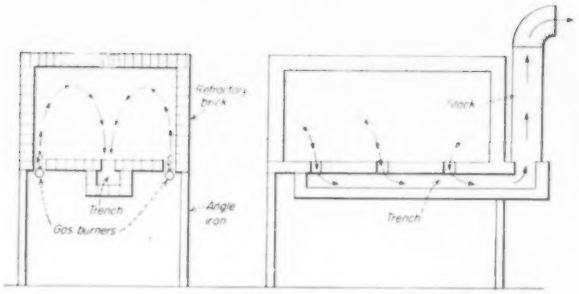
A low wax temperature calls



Wax Injection—The removable core permits both volume and pressure to be varied. To chill the wax to any desired temperature at the injection point, the plunger is extended and surrounded by a thermostatically controlled water jacket. A 4-in. pneumatic cylinder and 3:1 lever, with 50-psi. air, permits a force close to 1 ton against the mold. Higher pressures are seldom necessary or practical, because the wax tends to stick to the mold under increased pressure



Centrifuge—Cable from adjustable weight runs over pulley to be wound on sheave on centrifuge axis, the cable end having an eye to slip over a hook on the sheave edge. After "winding," the arm is held by a prop. Flask and mold are set at the end of the arm and the prop pulled out. This gives a 3- or 4-min. spin for yellow metals. To provide the 5-min. or longer spin required by aluminum, the initial speed is maintained by dropping down a ¼-hp. motor (on a hinge) which drives a disk on the shaft through a rubber pulley



Burn-out Oven—Very little gas is needed to heat this burn-out oven—not radically new, but a departure from the normal. It is of light refractory brick set on an angle-iron stand. Two gas burners next to the side walls produce the heat, exhausting through floor vents so heat is carried around and between flasks before it escapes by the center trench to the rear stack

for a high injection pressure. High wax pressure can be obtained by varying the force against the mold and by varying the size of the injection plunger; the smaller the plunger the greater the pressure. For examples, 100-psi. pressure on a mold with a plunger $1\frac{1}{8}$ in. in diameter will give 100-psi. pressure on the wax. The same pressure against a plunger $1\frac{5}{8}$ in. in diameter will give 50-psi. pressure.

A variety of means may be used to create the proper pressure against the mold. Pneumatic pressure is probably the simplest and most easily controlled, either direct or through the use of a lever.

A plastic in place of wax will stand a much higher pressure without sticking. At low pressures it requires no lubricant.

Centrifugal Casting

Now for the actual casting. Centrifugal force is used to obtain uniform density, uniform composition of metal and good surface finish on all pieces in the flask.

For best results there should be as little difference as possible between the pressure exerted on the top and bottom pieces in the flask. The most effective way of achieving this is to have the arm extending from the centrifuge make as wide a circle as conveniently possible. This distributes the pressure more evenly and keeps the alloys in the melt more evenly distributed. Where there is too great a difference in pressure between the top and bottom of the flask and the metal remains molten too long, the heavier metals in the alloy tend to settle.

If the arm is too short and there is too much difference between the centrifugal force at the crucible and the force at the bottom of the flask, so much speed is required to empty the crucible of molten metal that by the time the metal has reached the bottom it has gained such force that it has a tendency to crack and form fins on the lower castings—or sometimes break completely through the back of the flask. The only remedy, when this occurs, is to make a thicker, stronger wall of investment around the pieces.

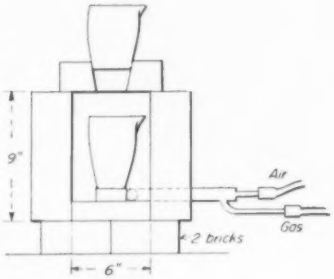
We cast into but one flask at a time so the metal in the crucible does not remain molten any longer than necessary.

The crucible is observed very closely while in the furnace. As soon as the charge becomes fluid enough to pour, it is immediately removed and placed in position against the flask and the centrifuge released. This much of the operation from furnace to releasing the centrifuge does not exceed 5 sec.

If the flask does not fill and the metal solidifies before it has a chance to fill all the niches of the flask, flask temperatures are raised until niches do fill out.

We once built a furnace to hold four crucibles to cast four flasks simultaneously. The time to transfer crucibles from furnace to centrifuge necessitates a higher metal temperature than needed otherwise, and in our opinion is not to be recommended.

Actually little, if any, time is saved by casting more than one flask at a time. It is not as though the operator had nothing to do while waiting for the completion of the cycle. There is always metal to weigh up for a new charge, slag to clean out of the crucible, filled flasks to quench, and castings to clean up. During casting, we have one crucible in the centrifuge, one in the furnace, and one preheating atop the furnace.



Furnace—For casting non-ferrous metals, this is a conventional 6-in. dia. furnace set on a couple of firebrick, with gas-air flame entering at a tangent from below. Flame circles crucible, then escapes through opening in center of cover. Furnace wall is wedge-shaped high-temperature brick 9 in. high and $4\frac{1}{2}$ in. thick. The cover (of 2 brick) has a square, tapered opening, into which a second crucible is wedged for preheating by gasses escaping around it. The furnace melts a charge every 8 to 10 min. Steel can be melted, but experimentally only

The casting machine should be variable in speed to allow for faster pouring where the flask has a large runner, slower for a small runner. It should not have to depend on a large space-consuming gate to keep from spilling the metal. It should pour slowly and steadily enough to keep from swirling the metal too much and entrapping air with it, and yet fast enough to keep it from solidifying before the flask is filled.

We have achieved this by building a centrifuge actuated by a variable-sized weight at the end of a flexible steel cable. Where the flask opening is small, a light weight is used and wound higher than when the flask has a large runner. A small-sized flask and crucible also require a much lighter weight than do the larger ones.

ROUND TABLE

The Lost Thousandth

"Al, I'm afraid that Smithers is about to quit us," frowned Ed.

"What happened, Ed? The fellow got another job?"

"No, not that, Al—the trouble this time is one of the smallest reasons I have ever heard of."

"You'll be losing a good man if he goes, Ed—just what is at the bottom of the trouble?"

"You're darn tootin' and all on account of an error of a thousandth of an inch! The drafting department claims that a drawing was changed by someone out in the shop in order to cover up a mistake."

"How is that possible? Wouldn't the tracing verify the figure on the blueprint?"

"The trouble is that this didn't happen to be a blueprint, Al; it was one of those rush pencil drawings on paper, shellac-covered for protection. Of course, handling with dirty hands does sort of mess up a drawing of that kind, and it's pretty hard to tell from what I could see if the dimension was tampered with."

"It resolves itself down to whose word is to be taken then—the mechanic's or the draftsman's."

"It looks like it, Al," replied Ed. "The draftsman claims that the figure is changed to one-thousandth smaller than was originally on the drawing. The chief engineer backs him up."

"Well, in that case I can't blame Smithers for getting hot under the collar, can you? They're practically calling him a forger as well as a liar."

"To tell you the truth, I don't know what to think, Al," Ed replied. "I have no reason for accusing Smithers of being dishonest; and I have no reason for questioning the statement of the draftsman. Both men have been perfectly honest up to now."

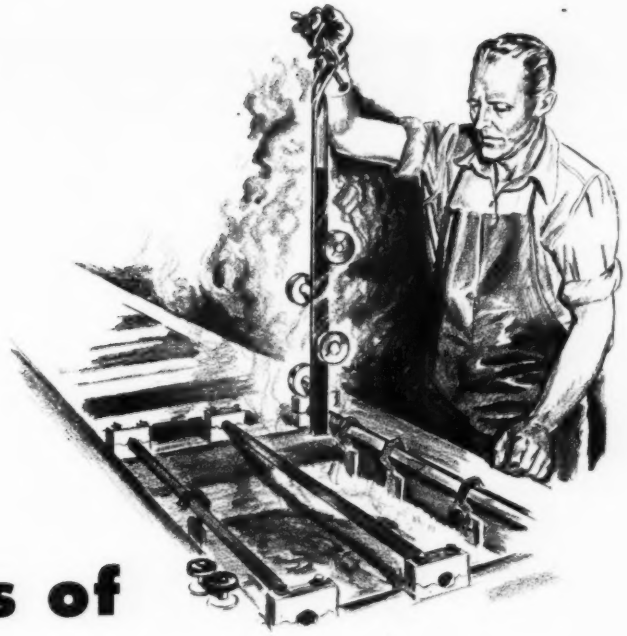
"Believe me, Ed, if anyone accused me of such a trick I'd not only pull out, but I'd lay around the corner and sort of take matters into my own hands—if you know what I mean."

"That is, you'd do it if you were in the right. But is Smithers in the right, Al? I don't know—either man, or even a third party, could have made the change, for some reason or other. Smithers is the victim, sort of, but that kind of thing happens all the time."

"Well, how about the guy who let a tracing get out onto the job? That's bad policy to begin with—maybe my friend, the chief engineer, is due for a little criticism and is trying to cover his man fast to avoid it!"

***HERE IS A REAL PROBLEM**—and a frequent one. What is the solution? Should Ed back up Smithers, as the chief engineer did his man, or should he be non-partisan? How can this problem be avoided? Your opinions and ideas will help others. Discussions of earlier topics appear on later pages.*

BY H. E. LINSLEY
ASSOCIATE EDITOR



Principles of Electroplating

PREPARED for the metalworking executive whose interest in electroplating concerns only the broad aspects of the process, this report outlines the general methods and equipment involved in production plating of the commoner materials.

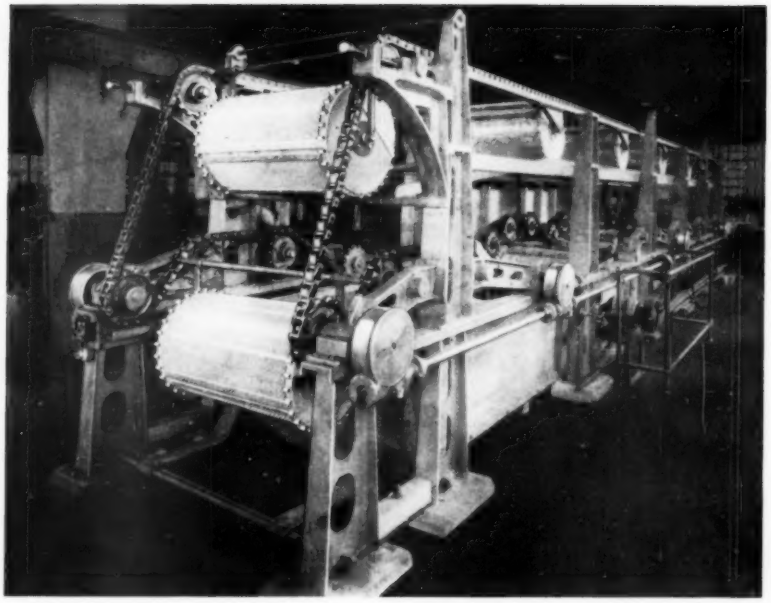
Modern technology has advanced electroplating to the point where virtually any metal, and some non-metals, can be deposited in a dense, impermeable coat of almost any desired thickness on any other metal and on some non-metals.

The mysterious secrets, once so jealously guarded by master platers that they were never written down, have now become common knowledge, thanks to the efforts of enlightened technical societies and trade journals. No longer does the plater purchase his own chemicals from a dozen scattered stores, and mix them at night, out of the range of prying eyes. Instead, standard products are purchased, and solutions are prepared to precise formulas under laboratory control.

Basically, the process is quite simple; cleaned work is immersed in an electrolyte, and an electric current is passed between the work and an anode of the plating metal. By the process of electrolysis, metal is transferred from the anode to the work in a thin, tightly adherent film. In practice, however, there are many variables to be considered in obtaining uniformity of coating at maximum efficiency and minimum cost. Process sheets for plating with various materials have been published as AMERICAN MACHINIST Reference Book Sheets in numerous issues during the past year.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

Copyright 1949 by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.



Fully automatic cleaning, pickling and acid-dipping machine for removing scale on small parts. Work is handled in acid-proof cylindrical baskets which automatically stop temporarily for loading and unloading purposes

PRINCIPLES OF ELECTROPLATING

Cleaning

OF ALL THE factors essential to the production of good plating jobs, none is of greater importance than cleanliness. Unless the work is scrupulously cleaned from the outset, no amount of care and skill in the plating operation can produce satisfactory results. Apparent cleanliness is not enough—the work must be chemically clean. It is impossible to place too much emphasis on this phase of the process, because a maculate (slightly dirty) condition is responsible for most plating failures.

Mechanical cleaning alone is not adequate for surface preparation, as particles of the metal or abrasive necessarily remain on the work and cannot be removed completely by wiping or blowing. Sand blasting or brushing is excellent for removing heavy accumulations of scale or dirt, but a chemical cleaning bath should be used for the final operations.

If there is considerable oil or grease present, it is advisable to remove this with a solvent degreaser to avoid excessive contamination of the chemical bath and destruction of its cleaning properties.

Alkali cleaners are the most common type, and may be used either in simple soaking baths or in an electric cleaning cycle. There are innumerable brands of cleaners available, but virtually all operate on the same principle, namely the reaction between sodium salts and oils to form soaps. In many cases soaps are added to the alkali cleaner to improve its performance by increasing its emulsifying and wetting ability. Where very hard water is encountered, however, the soap may form insoluble compounds which are difficult to rinse off. In such cases, wetting agents are added in place of soap.

Alkali-soap cleaners tend to produce considerable froth which limits their usefulness to soaking operations in which the work may be agitated. Their principal use is in cleaning iron, steel and brass, where at times some risk of slight surface attack may be tolerated. A broad field of usefulness is as a pre-cleaner before electric-alkali cleaning. Bulk cleaning in baskets, and as a step in barrel plating is commonly done with cleaners of this type.

When a direct electric current is caused to flow through the work in an alkali cleaner bath, either oxygen or hydrogen is released on the work surface. This speeds up cleaning by removing more of the inert dirt with the oils. If the work is made the cathode, large quantities of hydrogen are released, but the inert dirt removal may not be complete, foreign matter may plate out on to the work, and there may be some tarnishing.

If the work is easily attacked by alkalis, it must be made cathodic, but the above-mentioned troubles can be eliminated by making it anodic for a few seconds in a separate bath of the same cleaner. This is commonly called reverse-current cleaning. Steel, which is not attacked by alkali, can be cleaned by making the work the anode, provided the com-

pound will yield a sufficiently high current flow to insure thorough cleaning in a single operation.

Selecting a Cleaner

As a rule, the same alkali cleaners may be used for soak and electric cleaning, but it is advisable to avoid the use of alkali-soap mixtures in electric cleaning because of the froth produced by the soap. In some cases also, the soap or wetting agents may retard the operation and also may carry over on the work to contaminate subsequent baths. Preferred practice, therefore, is to use a preparation specially compounded for the job. When high-conductivity baths of high concentration are being used, a surface-active compound may be included to produce sufficient froth to control the spray of caustic thrown up by the rapid gassing.

The same cleaners cannot always be used for all metals; some are suitable only for ferrous materials, others for non-ferrous, and still others on several kinds of material when used at different concentrations. In any event, all alkali cleaners are used very hot, and should be followed by a flowing water rinse to remove all traces of the cleaner from the surface of the work. Electric cleaners require a minimum of 6 v for efficient operation.

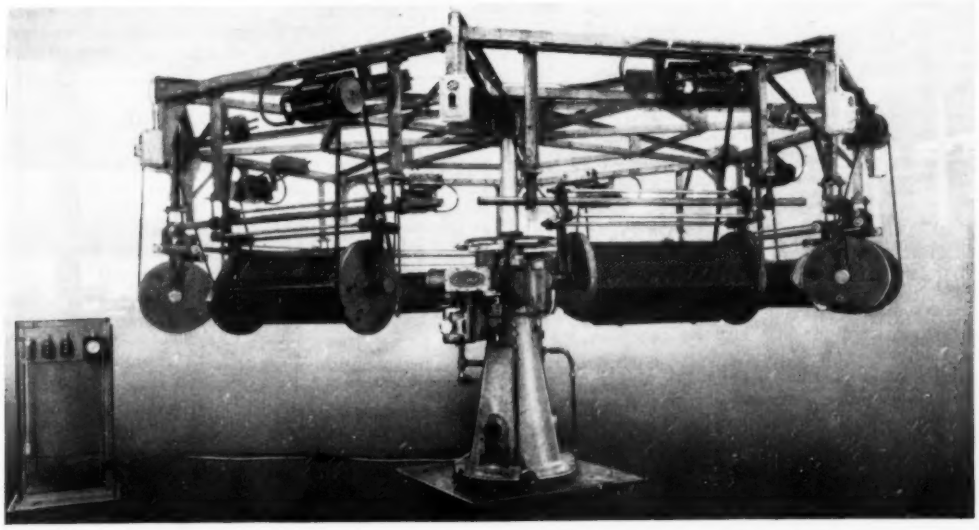
The type of cleaner to be used is governed by the kind, amount and condition of the oils, fats and greases present, by the kind and amount of solid dirt present, the ease of corrosion of the work, and the mechanical methods available or applicable. Selection falls to the material which will thoroughly clean the work in the shortest time, while the bath itself has the longest useful life.

Other common cleaners include special soaps for removing heavy accumulations of dirt and grease, and for cleaning highly polished surfaces by removing buffing compounds. They are particularly recommended for brass, aluminum and die-castings, as they will not cause any surface attack.

Removal of scale and rust presents an entirely different cleaning problem and is usually handled by a pickling process. This consists essentially of immersing the work in a solution of acid, usually sulfuric, at a fairly high temperature. The base metal reacts with the acid, and the resultant evolution of hydrogen mechanically lifts the flakes of scale from the surface. The process must be used with considerable care, both from the standpoint of operator safety and from the fact that the acid attacks and dissolves ferrous metals, causing a change in dimension and producing an eroded surface. This can be prevented to some extent by using inhibitors in the acid to retard its attack on the base metal without destroying its scale-removing properties or unduly delaying its action.

Inhibitors are not normally used with acid pickle in the plating cycle, as they make it necessary to follow the pickling operation with thorough electrocleaning to remove all traces of the inhibitor from the work.

Where heavy scale or rust is present, a pickling operation is often performed prior to the regular cleaning and plating cycle. Depending on the condition of the work, it may be necessary to degrease it before pickling, as the presence of oil will appreciably slow the pickling process. If an alkali degrease is used, the work must be well rinsed to avoid carrying over any alkali into the acid bath



Automatic Bullard-Dunn descaling and cleaning machine arranged to handle work in barrels. Process removes scale without attacking base metal, is fast in operation, and has high throwing power

and thus tending to neutralize it in a short time.

With continued use, acid pickling baths gradually become exhausted and slow down their action as the concentration of dissolved iron increases. The bath is usually discarded when crystallization of iron sulfate occurs on the bottom and sides of the tank as an indication of excessive concentration.

The problem of acid etching can be overcome by the use of the patented Bullard-Dunn process in which a film of tin is deposited on the work surface as soon as it is descaled, rendering it immune from any attack by the acid. The work is first cleaned in a strong alkali electrolytic cleaner, rinsed in cold water, and placed in a sulfuric-acid bath containing a small amount of tin. High-silicon iron anodes are used, with a few tin anodes to replenish the tin content, and current is supplied at 4-6 v for racked work, 6-9 v for barrel work. As the surface becomes clean enough to accept plate, the tin adheres to it so descaling action stops on those particular areas. Process continues until all surfaces are clean.

The tin flash may be removed immediately by anodic stripping in an alkali bath, or it may remain on the surface until plating operations are to be performed. After removal of the tin film, the work is given a cold-water rinse, followed by a dip in muriatic acid and another cold-water rinse.

Another electric process is that known as the Hanson-Munning bright dip, in which the work is made cathodic in an acid bath to remove scale, and then anodic in a second acid bath.

Also available are several proprietary products for rust and scale removal by simple soak, and the du Pont sodium hydride descaling process.

Plating Practice

ELECTRO-DEPOSITION of metals may be carried on in a variety of ways; the equipment may vary from huge, continuous, automatic plating machines to tiny, battery-powered setups in a glass beaker; and the plating solutions may be acid or alkaline. Whatever the equipment or bath, however, the fundamental principle remains the same; namely, the passage of an electric current from an anode, usually, but not necessarily, of the plating metal, to the workpiece, through an electrolyte containing salts of the plating metal in solution.

The rate of deposition varies directly as the current density, that is, the higher the amperage per square foot of the work, the faster the plate will be applied. There are, however, definite limits to current density, depending on the particular plating metal and the material of the workpiece. Too high a density will produce burning of the work and excessively large crystalline structure of the plate.

As mentioned above, surfaces to be plated must be scrupulously clean, but it must also be remembered the plating cannot improve the quality of a surface. If there are flaws and blemishes in the work, they will appear on the plated surface, and if a highly lustrous surface is desired, the surface must be polished or buffed before plating. Most plate is dead matte as it comes from the bath, but can be polished to the same degree as the base metal. Of recent years, however, bright plating baths have been developed from which the work emerges in a bright and lustrous condition.

A relatively new plating process known as periodic reverse current plating is rapidly being adopted and has proved most effective in producing a polishing effect on relatively rough basis metal. Sandblasted or emery finished surfaces, for example, can be periodic reverse-plated to a much smoother finish than that of the original basis metal. Coatings can be made extremely thick without danger of cracking or peeling—a ¼-in. coat is quite practicable.

The process consists of plating in the normal way for a period of from 2 to 40 sec, then deplating by current reversal for from ½ to 5 sec. Unsound and inferior metal is preferentially deplated, and the high spots gradually reduced. Each progressive layer of plate is exceedingly thin, but combines to create a denser and more homogeneous deposit than can be produced by continuous plating. The process is also substantially faster than conventional plating, because of the higher current densities that may be employed.

CURRENT REQUIRED FOR VARIOUS PLATING SOLUTIONS

Type of Plating Solution	Volts	Amp per sq ft
Brass	2-3	3-5
Bronze	2-3	2-4
Cadmium	1-4	15-45
Decorative Chrome	3.5-5	100
Hard Chrome	6	250
Cobalt-Sulphate	—	30-165
Copper-Cyanide	1.5-2	5-15
High Speed-Copper Cyanide	2-4	35-60
Rochelle Copper Cyanide	2-3	20-60
Acid Copper	0.75-2	10-40
High Speed Acid Copper	3.5-4.5	50-70
Gold-24 Karat	1-3	1-6
Gold-Flash	6-12	10-20
White Gold	6-10	20-40
Pink Gold	2-3	3-10
Iron-Chloride	—	100-180
Iron-Double Sulphate	—	20-30
Lead-Fluoborate	—	5-20
Lead-Perchlorate	—	20-30
Dull White Nickel	2-3	5-20
Bright Nickel	3-5	30-65
Platinum	3-4	9.3
Rhodium	2.5-5	10-80
Silver	1-2	5-15
High Speed Silver	3-4	50-60
Tin	2.6-4	10-25
Zinc	3-6	40-50

Gas Plating

Although this report is concerned with electroplating, mention should be made of a new and entirely different method of plating recently developed by Commonwealth Engineering Co., Dayton, Ohio. In this process, plating is effected by a gaseous medium and no electric current is involved. Metal carbonyls are decomposed by heat in an inert atmosphere of carbon dioxide, and the work is radiant-heated in a plating chamber served by a metal carbonyl generator. The plating gases are recycled in a closed system for economy of operation. Carbonyls of most of the commoner plating metals are now available.

An integral metal coating is obtained at temperatures of 400 F, and the process is applicable to any material that will withstand this temperature. Deposition is said to be absolutely uniform, and to take place much faster than by conventional methods of wet plating. For continuous plating of strip, for example, 13½ lb of nickel can be deposited in 1 hr.

Because electric power is not required for deposition, no difficulties are encountered in plating nonconductors, and paper, plastics, and other materials are readily processed if they can stand the heat.

Another type of dry plating that is becoming increasingly important is the vapor deposition method. In this process, performed under vacuum, metallic vapors are caused to condense on the surface of the work, producing a smooth, homogeneous coating. This method has been used successfully for aluminum plating telescope mirrors.

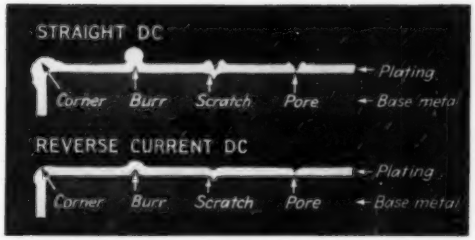
Copper Plating

Copper plating is probably the most common plating operation and is used for decorative or protective purposes on the base metal, for preventing carbon penetration during carburizing operations, and as an undercoat preparatory to chromium, nickel and some other platings.

Two general types of copper plating are in use; the acid sulfate and the alkali cyanide process. Of these, the acid process is the simpler, but cannot be used for direct deposition on iron, zinc, or several other metals. If this is attempted, copper will be deposited by mere immersion in the solution, and a spongy, non-adherent coating will be produced. If it is desired to use acid copper on steel, the work must first be given a thin coat, or flash, in an alkali plating solution, then rinsed and transferred to the acid bath.

The acid process can be used either hot or cold, although the cold process is generally preferred for its simplicity, as the heating of acid solutions always poses corrosion problems. It is popular in small shops where time is not of major importance.

In such cases the current density, that is, the number of amp per sq ft, is often low, and hence the rate of deposition of metal is slow. It is rarely used in large decorative plating installations but finds a major use in the electroforming and electrotyping fields.



Characteristic cross-sections of dc and reverse-current deposits, showing how reverse-current process tends to minimize defects and produce a smoother and noticeably brighter plated surface

Rolled, annealed copper anodes are employed, and higher current density and more rapid deposition is possible if the bath is heated and air agitated.

Hot alkali copper plating is standard in most shops. Deposits obtained are smooth and homogeneous, but the surface is dull and requires polishing if it is to be used as an undercoat for nickel or other plates. Brighter finishes can be obtained by adding lead carbonate or sodium thiosulfate, but such baths are somewhat difficult to control. More commonly the Rochelle salt bath is used and this bath is operated at 140 to 160 F, and approximately 3.6 min will be required to deposit 0.0001 in. of copper at 20 amp per sq ft and 2.2 min at 60 amp.

If full brightness is required it is preferable to use one of the proprietary bright copper baths. Some of these employ potassium salts in place of sodium, and are capable of producing extremely bright deposits which frequently require no buffing. Others, being only mildly alkaline, are particularly well suited for zinc-base die-castings as they will not readily attack zinc. Some of them are specially compounded for extremely high-speed operation and are capable of depositing 0.001 to 0.003 in. in 10 to 20 min. They differ greatly from the standard solutions and must be used in accordance with the manufacturer's recommendations. Generally, however, they are used at fairly high temperatures and high current density, require continuous filtration and agitation, and in some cases may employ entirely special types of anodes.

For heavy deposits at high-speed application, the copper fluoborate process is frequently employed. This is particularly useful for electroforming and electrotyping, and may be adjusted to produce either soft deposits that are easily buffed to a high luster, or hard deposits of high strength. Very easy to apply and control, the process is fast and extremely flexible, and because of the easy buffing, is widely used prior to bright nickel plating and for the plating of plastic novelties.

Nickel Plating

Standard nickel plating is performed in a Watts-type solution. The bath may be either hot or cold, and current densities may vary between 15 and 50

Decorative chrome plate is so thin that it is easily deformed by pressure, giving the appearance of a scratch. Hard chrome plate is actually no harder than decorative plate but is thick enough to resist the deformation

amp. Wetting agents may be added to control pitting, but brittleness of the deposit may result either from excess wetting agents or their decomposition products. Filtration of the bath through activated carbon will usually remove the organic materials which cause this. Agitation will permit the use of higher current densities, as will increased temperature, but may produce surface roughness unless the solution is regularly or continuously filtered and the anodes are bagged.

This bath will produce a dull plate that will require buffing if a luster is desired. For a bright plate, organic or inorganic brighteners may be added to the standard bath, but more satisfactory results are usually obtained by using one of the proprietary solutions. The alloy types, containing cadmium or cobalt, are particularly suited for corrosion resistance and high luster direct from the bath. The hardness may be varied from moderately hard to extremely hard by changes in the operating conditions or the salts used.

Black nickel is a purely decorative finish having poor ductility and corrosion resistance, and is usually applied in very thin deposits. It may be obtained by first plating with zinc or cadmium and then depositing the black nickel by simple immersion, or it may be applied by electroplating either directly over copper or brass, or over an undercoating of white nickel. When deposited over white nickel plate, the coating is more resistant to scratching and marring, but the apparent adhesion is not quite so good.

Zinc and Cadmium

For most purposes, zinc and cadmium are virtually interchangeable but there is a strong preference for zinc on the grounds of its substantially lower cost and greater availability. Both metals afford excellent rust protection to steel because, under corrosive conditions, the plate itself will corrode rather than the steel, and even if the surface is scratched, rust will not spread beyond the immediate area of the scratch itself.

Zinc may be deposited from an acid bath if a dead white, full matte surface is desired, but the throwing power of an acid solution is very poor and the process cannot be used for workpieces which have irregular surfaces. In general, acid zinc plating is used only for wire, sheet, and woven screen material.

The cyanide process is most commonly used in plating shops and gives excellent results. Standard solutions produce a dull finish, but brightness may be obtained either by adding brighteners to the bath, or by using a bright dip after plating. Several proprietary bright plating baths are available and also several proprietary bright dips. To preserve the luster, the deposits may be lacquered. Ordinary lacquers are not satisfactory over zinc deposits, but special lacquers have been developed for this purpose and give excellent results.

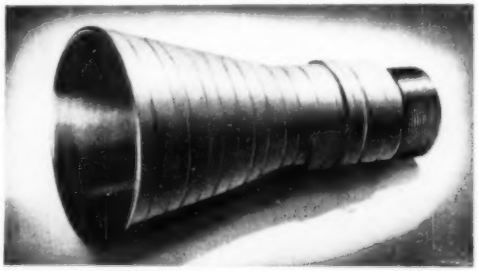
Zinc plate can also be colored, usually black or olive drab, by simple dipping in solutions that both protect the zinc from corrosion and can act as bonding surfaces to improve paint adhesion.

Zinc fluoborate solutions may also be used, and are particularly suitable for plating directly on cast and malleable iron. The process is much faster than with other solutions and is well adapted to high speed, continuous plating of wire and strip.

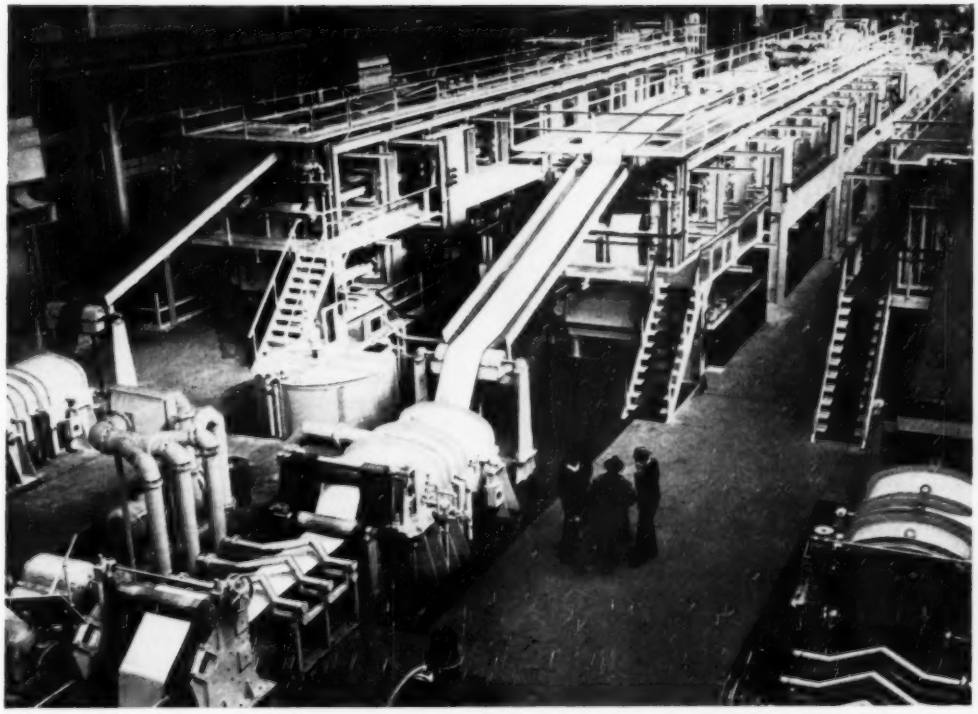
Cadmium plating solutions are similar to zinc, except that acid solutions are not used. Bright plates can be produced by the use of additives in the standard bath or by one of the proprietary bright plating baths. Bright dips and coloring dips may be used in the same way as for zinc.

Chromium Plating

In recent years chromium plating has achieved tremendous popularity as a decorative finish because of its blue-white color and high resistance to corrosion and tarnish, but its extreme hardness



Stopoff tape provides a simple means of restricting plating to certain areas of a workpiece. It is readily wound around work of any shape and prevents the solution from contacting the surfaces so protected



Continuous, automatic, high-speed, electrolytic tin lines for tin plating strip steel at speeds up to 1000 fpm incorporate high-frequency heaters for flowing the tin to produce a mirror finish

and excellent wear resistance make it of even greater importance in the industrial field.

It has become customary to differentiate between chromium plating for decorative and industrial uses by designating the latter as hard chromium. Actually, the hardness of both is approximately the same; the difference lies in the hardness of the basis metal and the deposit thickness. Decorative plate is usually applied over undercoatings of copper and nickel or of nickel alone, and has a thickness of only 0.00001 to 0.00002 in. Industrial chromium is usually applied directly to hardened steel and may reach thicknesses as high as 0.010 in. Consequently, the thin decorative flash is easily deformed, due to lack of backing, and gives the appearance of being softer.

Chromium is usually applied bright to avoid the trouble and expense of polishing, and is widely used for building up worn machine parts and gages, for producing a hard, wear-resistant surface on rolls, for improving the life of drawing dies and plastic molds, for increasing the life of cutting tools of all kinds, and for reducing the friction and wear between cylinders and piston rings. In the latter connection, porous chrome is frequently applied to cylinder walls because of its ability to retain a film of lubricant in the pores of the metal.

Lead anodes must be used, and these are frequently made to conform to the shape of the workpiece to produce equal coverage over irregularly shaped surfaces.

Tin Plating

Tin may be electro-deposited from acid, alkali or fluorborate solutions. The acid process will not produce as adherent a coating as the alkali, nor is the throwing power as good. Rate of deposition, however, is much higher, and acid baths can be operated at room temperature, while alkali must be heated. Fluorborate baths are extremely fast and simple to operate at room temperature.

Deposits are always silvery white in color, and it is not possible to obtain a bright finish direct from the bath. This finish, however, may be produced by heating the plated parts at a sufficient temperature to cause the tin coating to flow, resulting in a finish equivalent in appearance to hot-dipped tin but with only a fraction of the thickness obtained by that method.

The Halogen process, developed during the war, is particularly applicable to the electro-tinning of continuous strip at extremely high speed. With this process it is possible to deposit a uniform coat-

ing of one-half pound of tin per base box of 217.7 sq ft of steel. On 32-in.-wide strip, plated on both sides and running at 1000 fpm, approximately 200 amp per sq ft current density is required. Modern installations of this type include a high-frequency heater for flowing the tin to produce a mirror-like finish.

Other Metals

Lead, lead-tin alloy, brass, bronze, and iron are among the common metals most frequently plated; silver, gold, rhodium, indium, arsenic, palladium, and platinum are also used to some extent industrially, although their greatest field is in decoration. Silver, however, is being used to a considerable extent in electrical work and for engine bearings, and gold in various types of electronic work. Indium is frequently used over lead-plated bearings to protect the lead from attack by acids in lubricating oil, and sometimes on the surface of stamping dies to increase their useful life. In both cases the indium is diffused into the basis metal by heating in a low temperature furnace.

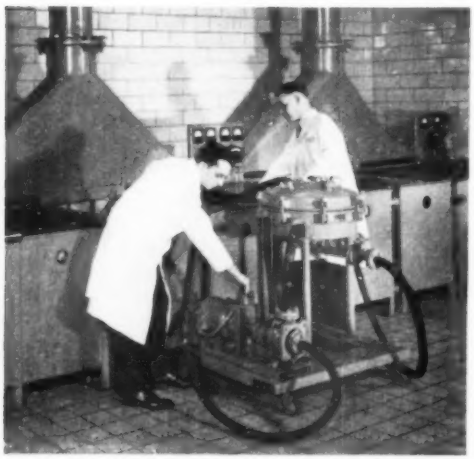
Plate can be applied to almost every known metal, although some are more difficult than others and may require a preliminary coat of one type of metal before the desired coat can be applied. Aluminum, and magnesium, for example, must be given a zinc immersion plate, followed by a copper strike, before other plates can be applied.

Non-metallic materials such as glass and plastics can be plated without much difficulty, provided an adherent conductive coat can first be applied. Metal spraying is frequently used for this purpose, although excellent results can be obtained by painting with ordinary bronzing powder in a lacquer or varnish base. After pre-coating, plating proceeds in the usual manner. Various other methods of pre-coating, such as vacuum deposition, metal dusting, and chemical reaction are also available. Graphite dusting is also used to some extent, but conductivity is poor and it is not always possible to obtain a good bond between the graphite and the base material. In the case of wood or other porous materials, it is essential that the pores be filled with a sealing or impregnating compound. Highly polished surfaces must be slightly roughened for best adhesion.

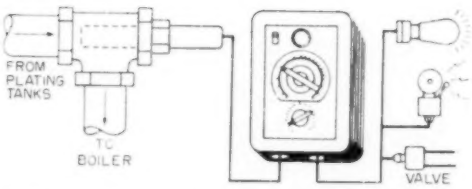
If plate is to be applied only to certain areas of a metal workpiece, the desired results can be obtained by insulating the other surfaces. Special stopoff lacquers are available which can be simply painted on the surfaces not to be plated, or adhesive stopoff tape can be wound around the parts. Wax can also be used, but as it will melt in hot baths its use is limited to cold solutions.

Plating Room Equipment

TANKS used to contain plating solutions necessarily vary with the nature of the bath, and to some extent with the size of the installation. For very small setups for jewelry and experimental work, glass or stoneware crocks are commonly employed, but industrial plants usually use steel or wood tanks, and occasionally earthenware.



Periodic filtration with a portable unit is effective if performed with sufficient frequency. The same unit can be employed for a number of tanks, which reduces the cost of the process and the capital investment



Boiler protection against acid-contaminated condensate is afforded by an electronic device in the return line which warns of the tiniest trace of acid and operates a valve to divert the water to waste lines

Alkaline solutions are usually handled in plain steel tanks, although some platers prefer a rubber-lined tank to avoid any possibility of contamination of the bath by iron. Some of the synthetic plastic materials also are excellent as liners, provided their temperature limitations are not exceeded. Non-metallic linings have the advantage of stopping stray electric currents.

Acid solutions may be handled in lead-lined or rubber-lined tanks, depending on the particular material involved. Rubber-lined tanks are preferred for bright nickel, and care must be taken that the

materials used in compounding the rubber are not attacked by the solutions so as to produce contamination. Lead-lined tanks, or those lined with bituminous materials, are not recommended for bright nickel solutions.

For chromium plating, the best results are obtained with a lining of acid-proof brick, although lead linings are very commonly used. Bare steel can be used, but will corrode in time. Rubber, however, must be avoided as it will disintegrate in the chromic acid solution.

Work is always rinsed when it leaves the plating bath, and considerable economy can be effected by installing two rinse tanks. The first removes the major part of the plating solution dragged out with the work, and the dilute plating solution thus produced may be used as makeup for the plating tank, thus saving valuable salts. The second rinse tank should be arranged for running water to insure complete rinsing. Plain steel, or even wooden tanks will serve for the second rinse, but the dragout tank should be lined if an acid plating solution is being used. Otherwise, severe corrosion will take place.

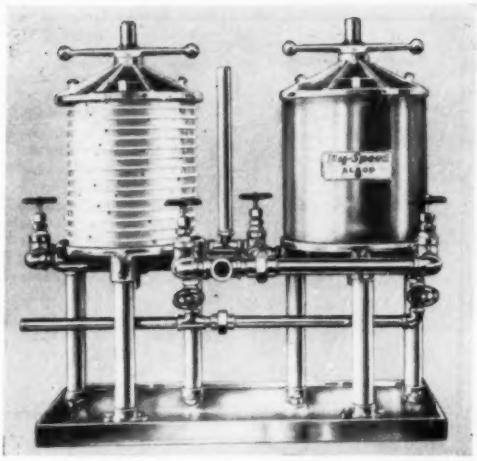
Stainless steel is suitable for both acid and alkali solutions but is too expensive for most large installations. It is particularly suitable for holding concentrated nitric acid for bright dipping, although ceramic crocks will serve equally well. When these are used they should stand in a tank of water to both reduce the temperature and avoid accidents if the crock should break.

Tank Heaters

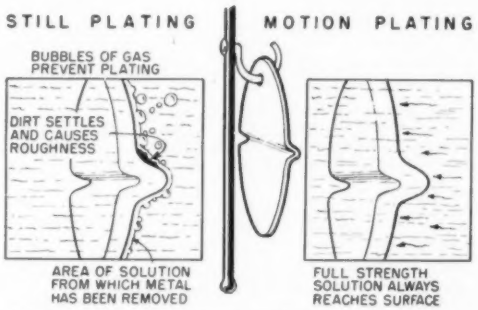
As most plating solutions are used hot, suitable means of heating the tanks must be provided. Steam coils are the simplest and least expensive and iron coils are suitable for most alkali solutions. In acids they should be either stainless steel or lead, depending on the solution. In electroplating and electric cleaning baths, the coils should be insulated from the steam supply line by means of insulating couplings to avoid short circuits.

Coils should be located along the sides of the tanks, not on the bottom where they make cleaning a problem and also make it difficult to recover work which falls off the plating racks. Side mounting also makes for better circulation and more uniform heat distribution, and prevents the coils from becoming insulated by dirt and sludge. Joints in pipe coils should be welded to avoid the possibility of leaks which would dilute the solutions. Leakage of acid plating solution into the steam pipes may have serious effects on the boiler when the condensate returns, and modern plants now employ an electronic device which detects the slightest trace of acidity in the condensate, sounds an alarm, and bypasses the condensate from the regular return line into a waste vent.

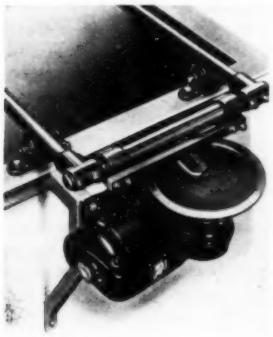
External heat exchangers offer an ideal means of tank heating in that they insure thorough circulation and freedom from the possibilities of current leaks. When used in conjunction with a continuous filtration system, they can be operated by the same



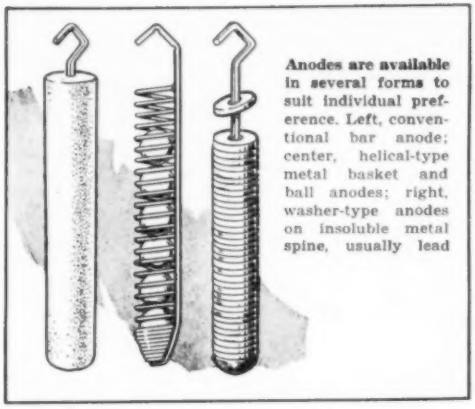
Continuous filtration of plating solutions by a permanent setup is recommended for highest quality work. Sludge and foreign particles are removed before they can cause roughness on the work surface


STILL PLATING
MOTION PLATING
BUBBLES OF GAS PREVENT PLATING
DIRT SETTLES AND CAUSES ROUGHNESS
AREA OF SOLUTION FROM WHICH METAL HAS BEEN REMOVED
FULL STRENGTH SOLUTION ALWAYS REACHES SURFACE

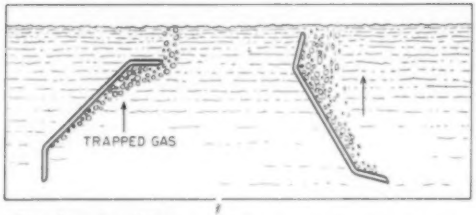
Still plating, left, frequently produces poor results because of adhesion of gas bubbles and exhaustion of the solution in contact with the work. Motion plating, right, overcomes these difficulties



Rod agitators coupled to the cathode rods serve to keep the work in constant motion. Reciprocation may be produced by a rotary plate, crank action, or a slow-acting air cylinder



Anodes are available in several forms to suit individual preference. Left, conventional bar anode; center, helical-type metal basket and ball anodes; right, washer-type anodes on insoluble metal spine, usually lead



Cup-shaped articles must be suspended in the plating tank in such manner as to avoid trapping the evolved gases or creating pockets that will cause execessive dragout of solution when the work is removed

circulating pump. Silicon iron is commonly employed for heat exchangers and is suitable for handling most plating solutions. For extremely corrosive conditions, however, the carbon type is preferable.

Steam jackets are fairly common, but require careful insulation to prevent the operators from being burned and to avoid excessive heat losses into the plating room. Immersion heaters and open-flame gas heaters are also used to some extent, principally in smaller shops.

Filtration and Agitation

First-class results cannot be obtained with dirty solutions, whether the contamination results from air-borne dusts or from sludges formed by the chemical reactions within the plating bath itself. Hence, filtration is essential for the maintenance of top-quality work in all plating solutions, with the notable exception of chrome plate. Continuous, automatic filters are highly desirable, but tend to be too costly on smaller installations. Periodic filtering with a small portable filter unit, however, is simple and highly effective if performed at sufficiently frequent intervals. The exact intervals, of course, will vary with individual bath and local conditions.

Care must be taken in selecting a filter to see that it will be suitable for the various fluids to be handled, particularly as regards the housing and the pump. Stainless steel is commonly used, although silicon iron is suitable for the larger, fixed installations. Earthenware is also available but must be handled with considerable care to avoid cracking and leakage.

Agitation of a plating bath is desirable in most cases, as it promotes more even plating and permits a faster rate of deposition. Power-driven agitators of the propeller type with corrosion-resistant shafts and propellers are widely used and are suitable for most operations. Air agitation is also employed by permitting compressed air to escape through a perforated pipe in the bottom of the tank. This is usually less expensive, but great care must be taken to see that the air is free from oil or other contaminants. In many of the solutions air cannot be used as it will cause decomposition of the bath.

Agitation of the work is desirable for the production of an even coat by averaging the distance between the work and the anodes, and preventing local exhaustion of the solution. This is readily performed by reciprocating the cathode bars on which the work is suspended. Small gear-motor reciprocators handling one or more cathode bars are usually employed for this purpose, but double-acting air cylinders with automatic valves are sometimes found. Manual agitation may also be used.

Types of Anodes

Brass tubing may be used for anode and cathode rods, but when loads are heavy or high amperage is to be carried, as in chromium plating, solid copper rods are necessary. The rods are insulated from the tank in a variety of ways and are sometimes carried on wooden blocks. These, however, are unsatisfactory, as they become waterlogged and cause short-circuiting. Plastic or hard fiber is suitable, although porcelain is the most reliable.

The anodes themselves, in most cases, are bars of the metal being plated and are hung from the anode bar by hooks of square cross section so disposed that the sharp edge of the square tends to dig into the bar to insure good electrical connection. The ratio of anode area to cathode (work) area is important, but varies with different types of baths. In general, however, it should be about 2:1.

The bar anode is widely used, but many platers prefer the ball anode as being easier to handle and control. As plating proceeds, the anode is eaten away, and with bar anodes the area becomes steadily smaller, and pieces fall off and drop to the bottom of the tank, where they serve no useful purpose. The stub ends may be sold as scrap, or they may be used up by placing them in a basket suspended from the anode rod. Ball anodes, on the other hand, are held in wire baskets below the surface of the solution, and as they are used up it is a simple matter to drop another ball into the container. The smaller pieces work their way to the bottom and are completely consumed. Balls are made up in various different metals, and care must

be taken not to mix those which are similar in appearance. One manufacturer now produces a zinc ball anode with a distinctive flat top to distinguish it from cadmium or tin. Some metals, notably copper, are also supplied in the form of flat washers to be slipped over a central spine. Ball anodes are used only with alkaline solutions which will not attack the containers, as these are normally steel.

Cloth bags are frequently used to cover the anodes to prevent particles of metal, carbon or oxides from getting into the bath where they would be carried over to the work and cause roughness, porosity, and a decrease in the protective value of the coating. Bags must be free from the filler material commonly used in new fabric, and are sometimes treated with a synthetic resin at top and bottom to act as a pocket to collect sludge and prevent it from working through the cloth.

For chrome plating, lead anodes are used, and these are frequently shaped to conform to the general contour of the work to insure even distribution of plate to all surfaces. Steel or stainless steel anodes are used for plating arsenic, indium, and in some gold solutions, and carbon anodes for black nickel and sometimes in bright nickel baths.

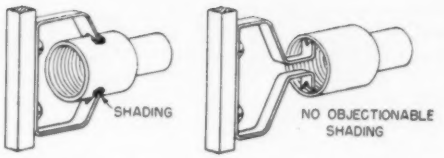
Only the purest metal is suitable for anodes, a minimum purity of 99% being required in most cases, except where definite amounts of iron and carbon are desired, as in some nickel anodes. Impurities in the anodes will produce rough, unsatisfactory work, excessive sludge in the tanks, uneven corrosion, and a variable metal content in the bath.

Work Holding Racks

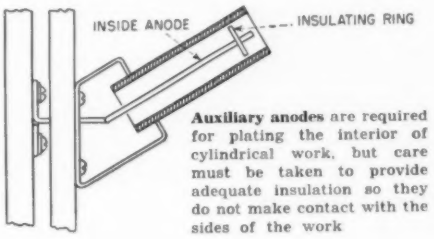
Actually, there are almost as many different plating racks as there are different pieces to be plated, and for quantity-production work it is customary to design special racks to suit the particular job. A great deal of work, however, can be handled on standard racks, and the task of designing special racks can be greatly simplified by the use of standard components such as spines and hooks assembled to suit particular conditions.

A plating rack consists essentially of a central spine terminating in a square hook, and a series of smaller side hooks to carry the work. In some cases a central frame may be used, usually rectangular, and two supporting hooks. The frame or spine must be strong enough to support the work, and must have high electrical conductivity.

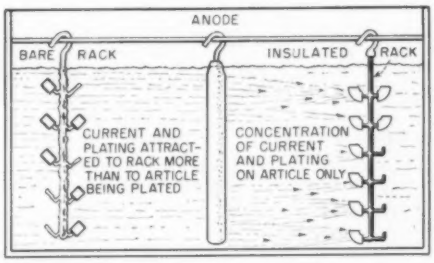
Size and shape of the work-supporting hooks and their position on the carrier will depend entirely on the shape and size of the work and on the surface to be plated. Cup-shaped articles must be hung in such a manner that the gas evolved in plating can escape freely and not become trapped in pockets where it can drive off the solution and produce unplated areas. Spacing of articles on the rack is important, as too close spacing will cause one part to shade another, producing thinly plated areas. The hooks or tips for holding the work must be so designed as to contact the work in a non-critical area to avoid blemishes and to eliminate any tendency to shade or cause streaks on the surface.



Contact of the tips with the work should be made in a non-critical area to avoid blemishes and eliminate any tendency to shade and cause streaks on the surface



Auxiliary anodes are required for plating the interior of cylindrical work, but care must be taken to provide adequate insulation so they do not make contact with the sides of the work



Plating racks require proper insulation to prevent them from receiving more current and more plate than the workpiece. Coating must have high dielectric, shock, abrasion, and chemical resistance

Racks should be sufficiently short that the lowest article carried will clear the bottom of the tank by at least 6 in., and the highest article will be at least 1½ in. below the surface of the solution in still tanks, and 2½ in. in agitated tanks. On conveyor type installations the rack must be able to clear the top of the tank when raised, and be able to turn corners without fouling adjacent racks.

For tubular work or deep holloware, auxiliary anodes must be employed inside the work. These should be carefully centered to insure even deposition of plate and equipped with insulating devices to prevent their touching the work. Auxiliary anodes may also be necessary when plating large flat surfaces to prevent heavy plating around the edges and light in the central area.

On sharp points or edges there is a tendency toward burning, as there is a heavy plating action on a very limited area. This can be avoided by the

use of a thief, or burning guard, placed close to the point and attached to the cathode bar. This attracts the plate and evens the distribution. Its size must be determined by experience. If it is possible to so locate the work that two points come adjacent to each other, each will protect the other from burning and there will be no waste of plating metal.

The entire surface of a plating rack, with the exception of the suspension hook and the contact point for the work, should be carefully and completely insulated. There are numerous ways of doing this, including wrapping with rubber and vulcanizing, plating with special rubber, coating with various plastic substances, and wrapping with waterproof insulating tape. The choice of insulation is governed partly by the type of solution used and partly by the nature of the work. In any case, the coating must be heavy enough to withstand considerable abrasion, have high dielectric strength, be impervious to chemical attack, be tightly bonded to the metal, and have a smooth surface.

Plating Barrels

Small objects, and those not easily damaged by tumbling, are frequently plated in plating barrels. This is much quicker than racking and unracking individual pieces and is satisfactory for a wide range of work, provided the pieces do not tend to nest together or become tangled.

Two principal types of barrels are used; the horizontal and the oblique. The horizontal type consists essentially of a perforated drum, usually hexagonal, constructed of bakelite, hard rubber or similar material, and provided with a door held in place by various locking devices. It is supported on current-carrying V's on top of a tank and is rotated by suitable gearing. Plating current passes through the hanger arms or by separate cable through hollow trunnions to the work contacts in the barrel. The contacts are short chain danglers, solid rods, end plates, or other surfaces which the parts can touch as they are tumbled about. Regular anodes are used along the sides of the tank, but the solutions must sometimes be modified slightly from those used in tank plating.

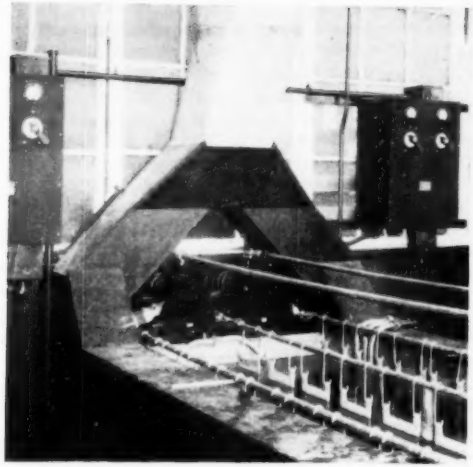
The barrels are lifted out of the tank for loading and unloading and may be used as single units or may be transferred from tank to tank automatically in a complete cleaning and plating cycle.

Oblique barrels are employed chiefly for small-lot

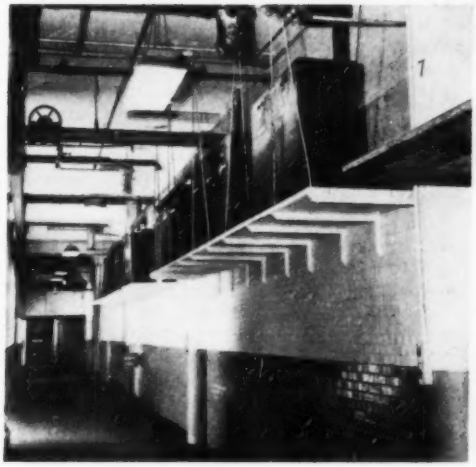
METALS AND INSULATIONS FOR VARIOUS PLATING REQUIREMENTS

Kind of Plating	Rack Metal	Tip Metal	Contact	Insulation
Acid Copper	Copper or Brass	Monel, Copper, Brass	Gravity	Hard Rubber, Universal Plastic
Cyanide Copper & Brass	*Iron or *Copper	*Phosphor Bronze, *Steel, Brass	Gravity	Hard Rubber, Neoprene, Universal Plastic
Gold, Indium, Rhodium, Platinum	Brass or Steel	Stainless Steel, Nichrome	Gravity or pressure fine spring	Hard Rubber Plated, Soft Rubber Plated, Universal Plastic
Iron (Ferric Chloride Solution)	Heavy Copper	Copper, Everdur Bronze (exposed tips lead coated)	Pressure or Gravity	Hard Rubber, Universal Plastic
Lead Fluoborate (Copper Sulphate Solution)	Copper	Monel, Bronze, Copper, Brass	Gravity	Hard Rubber, Universal Plastic
Dull Nickel	Brass or Copper	Brass, Copper, *Bronze	Gravity except pressure essential with die cast parts	Hard or Soft Rubber, Neoprene, Universal Plastic
Bright Nickel	Copper	Brass, Copper, *Bronze	Gravity or Pressure (pressure essential for die cast parts.)	Hard or Soft Rubber Neoprene, Universal Plastic
Silver	Brass, Nickel or Steel	*Steel, *Stainless Steel, Nichrome	Gravity	Hard Rubber, Universal Plastic
Tin	Brass or Copper	*Phosphor Bronze, Brass, Copper	Gravity	Hard Rubber, Universal Plastic
Acid Zinc	Brass or Copper	*Bronze, Copper, Spring Brass	Gravity	Hard Rubber, Universal Plastic
Cyanide Zinc	Copper	Steel, Bronze	Gravity	Hard Rubber, Universal Plastic
Cadmium	Brass or Copper	Steel, Bronze	Gravity	Hard Rubber, Universal Plastic
Chromium	Copper (heavy)	Spring Bronze	Pressure	BELKE Chrome Rubber, Universal Plastic, also Neoprene
Bullard-Dunn Process	Steel with heavy Copper Cath. Hook	Monel	Gravity	Hard Rubber, Universal Plastic
Anodizing	24 or 17 ST heat treated aluminum	Spring Aluminum usually non-removable	Pressure	Hard Rubber, Neoprene, Soft Rubber, Universal Plastic

*Kind of metal recommended



Copper-plating tank equipped with step-voltage regulators to supply 2 circuits at 6 v and 1500 amp each. Only the control panels need to be installed inside the plating room



Copper-oxide rectifiers require a minimum of attention and can be installed on shelves outside the plating room where they take up no actual floor space. They can also be stacked on the floor in a compact arrangement

work and are multi-sided barrels open at one end and fastened at the other end to a rotating shaft. They can be tilted to any desired angle. The barrel is partly filled with plating solution and the work loaded through the open end. An anode is supported on a suitable holder so as to be partially immersed in the solution, and the circuit is completed through contact buttons located in the bottom of the barrel, or by chain or other types of danglers.

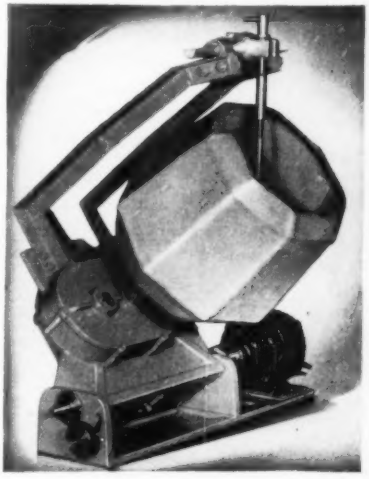
Electrical Equipment

Current for electroplating is always dc, and is usually supplied at about 6 v for racked work, 12 to 15 v for barrel work, although this varies somewhat with different materials. For most industrial uses current is furnished by a motor-generator set or a copper-oxide, copper-sulfide, or selenium rectifier. The choice between m-g set and rectifier is governed chiefly by the conditions in the particular shop and should be carefully considered.

Generators are widely used and are quite efficient if voltage requirements are constant and the load is sufficient to keep them operating at or near full capacity. With a fluctuating load, however, efficiency drops sharply, and if different voltages are required, rheostats must be installed at each tank

← **Horizontal plating barrels** are available in a variety of shapes and sizes, and with various barrel-hoisting arrangements. They may be used as single units or on automatic or semi-automatic machines

→ **Oblique plating barrels** are particularly adaptable to small-lot production of small parts. Requiring a minimum of floor space and plating solution, they are extremely economical to operate and maintain



to produce the required voltage drop from bus to tank. This results in an appreciable waste of power. Moreover, to the original cost of the generator set must be added the cost of special foundations and regular maintenance.

On the other hand, rectifiers connected to each individual tank consume power only when that particular tank is in operation, there is no maintenance required, foundations are not necessary, and the overall efficiency is substantially higher than that of generator sets, except at full rated capacity when the generator may or may not have a slight advantage. Voltage regulation is by means of a transformer placed ahead of the rectifier, and hence causes little or no loss of power.

Synchronous converters, mercury-arc rectifiers, tube rectifiers, and even batteries may also be used as sources of dc, but are not generally found in industrial setups. Whatever source of power is used, however, it should be carefully protected from the effects of corrosive fumes, and from general dust and dirt. If possible, it should be housed in a separate, well-ventilated room.

Power leads, or buses, from the source to the tank must be of ample capacity to reduce transmission losses to a minimum. Flat copper bars are commonly used as they are easy to bolt together in sections, and leads to the anode and cathode rods are readily attached.

A voltmeter and ammeter should be supplied for each tank, and a current density meter, while not essential, will be found useful for indicating the actual current density without the necessity of calculating the area of the work.

Tank rheostats or rectifier controls should be located at each tank within easy reach of the operator but high enough above the tank to avoid splashing with solutions.

Ventilation and Safety

The fumes from many plating solutions are both toxic and corrosive, and every precaution must be taken to prevent their escape into the plating room. Exhaust fans must be of ample capacity, and duct work should be lined with asphaltum paint or other corrosion-resistant material to prevent their rusting away. Overhead hoods and ductwork are still widely used but the trend is toward side exhaust openings with downdraft ventilation.

All heated tanks, and all acid tanks, whether hot or cold, should be equipped with exhaust openings, and the suction should be great enough to pull all steam and fumes from the surface and prevent their rising into the atmosphere. Steam from plain hot-water tanks should be exhausted in the interests of worker comfort and improved equipment life.

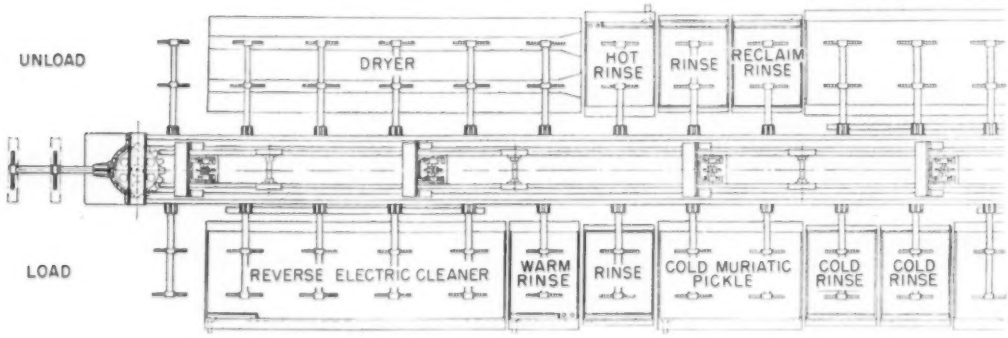
Drains for the condensate should be provided at intervals to protect the fan and should lead directly into the plumbing system.

Both the acids and strong alkalis used in the plating room are dangerous to handle, and workers must be offered every protection. Heavy rubber gloves and aprons should be provided, and first aid equipment should be readily available, especially for cases of cyanide poisoning. Rubber shoe soles and heels should not be worn because of the danger of slipping on the usually wet floors. Rubber buckets and proper carboy carriers should be provided for the handling of acids.

In some solutions, particularly in chrome plating, the evolution of gas is so rapid as to set up a spray of liquid over the surface of the tank. This is wasteful and potentially dangerous, but can be avoided by blanketing the surface with a layer of small plastic floats. These do not interfere with insertion or removal of the work, but they serve to effectively control the spray.

Plating Room Layout

Layout of a plating room will necessarily depend on the space available and on the types of plating performed. Due regard should be given to the sequence of operations and to the reduction of handling time. It is usually cheaper to install a separate rinse tank for each rinsing operation, for example, than to carry the work back and forth several yards to make use of a common tank; to say nothing of the danger of spoiling work by rinsing in a



Layout of a typical fully automatic plating conveyor, including every operation from cleaning to drying.

bath contaminated with other solutions, and carrying contaminants into the plating bath.

Floors should be made of acid- and alkali-proof tile, or should be provided with wooden duckboards. They should be arranged to slope into drainage troughs to avoid puddles and to permit their being hosed down for cleaning.

Tanks should be insulated from the floor to prevent stray currents from passing between them, and are frequently placed in pits connected with the common drainage system. Water and steam pipes are usually carried in ducts below floor level, with only the handles of the valves exposed. Tank dump valves should be protected against accidental opening, preferaly by removing the handles.

Because of the corrosive properties of the materials involved, silicon iron should be used for all drainpipes leading to the main sewer.

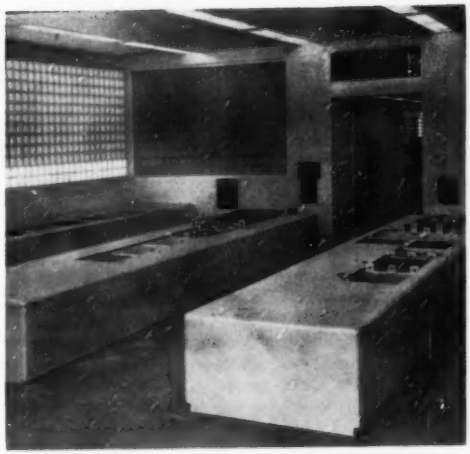
Automatic Plating Equipment

Small-lot work is usually transferred from tank to tank by hand, and medium-quantity work or heavy parts may be handled more expeditiously by power hoists operating on a monorail. For high production, however, semi-automatic or fully automatic equipment is faster, more economical, and requires a minimum of floor space.

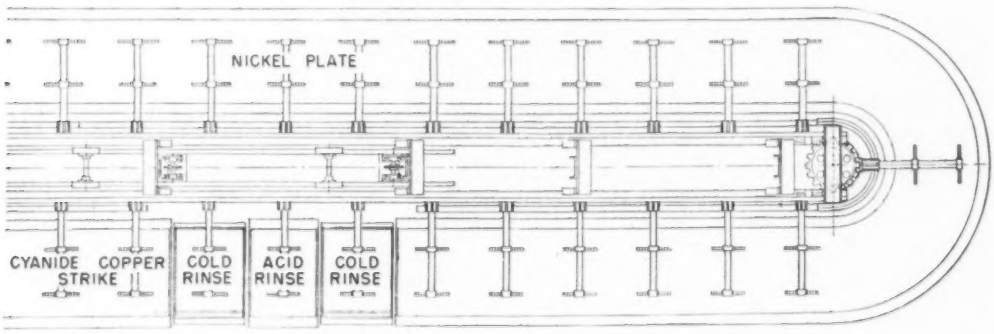
Each installation must be designed specifically for the work to be done, but is usually adaptable to a wide variety of parts within its physical limitations. In semi-automatic machines, work racks are loaded on to a continuously moving conveyor loop and carried through a tank of solution. Unloading usually takes place at the loading station. Thickness of plate depends on the length of time required for the conveyor to complete its cycle, and is controlled by varying the speed of travel by means of a variable speed transmission. Travel may be straight down the center of the tank or may follow a weaving path or may rotate to obtain increased agitation and more even distribution of plate.

Fully automatic machines perform the entire plating sequence from the first wash to the final rinse and dry. Since their operation involves transferring the work from tank to tank, some type of lifting mechanism is necessarily combined with a conveyor. The variety is almost endless, as each machine is designed specifically for the type of work it is to handle. In some cases the work may be handled on trays or in perforated barrels, in others it may be supported on plating racks which may be attached to the conveyor or may be carried on support bars long enough to handle a number of racks.

Machines may be arranged in a straight line, with loading at one end and unloading at the other, or may incorporate a return conveyor, with or without a drying oven. In other types the machine is disposed in an oval or rectangle. The time in each bath varies from a few seconds to many minutes, the actual plating requiring the longest time, and since the conveyor must travel at a uniform speed, the time in each bath is governed by the length of



Careful planning and attention to details can produce a plating room layout that will give pleasant working conditions and eliminate the sloppy conditions frequently associated with plating



Units of this type must be designed specifically for the job, but utilize many standard components

the individual tanks that make up the installation.

Work in the bath may be rotated or oscillated to obtain an even plate, and carriers can be made to dwell at the loading and unloading positions to provide sufficient time for performing these operations. Full-automatic machines can often be served by a single operator, although at least two are necessary for the non-return type, and for return types handling a large volume of work.

Inspection and Test

With baths that are strictly up to par, it is possible with very careful control of current density and close attention to anode spacing, to control the thickness of plate to extremely close tolerances. This procedure is often followed for such jobs as chrome plating worn gages or machine parts up to size without the necessity of subsequent grinding. A light lapping is then all that is required.

For production work, such close controls are impracticable, and work is spot checked at intervals by a small electronic or magnetic gage. Closer checks should be made at intervals by the laboratory, using a plater's microscope for measuring the thickness of a cross-sectioned piece, or by measuring the time required for a standard acid drip to dissolve the plate and expose the basis metal.

All plating and cleaning solutions should be checked chemically at least once a day if uniform results are expected. With hand-operated still tanks it is a simple matter to give the work an extra dip in the cleaner or leave it a few minutes more in the plating tank, but with automatic equipment these minor corrections cannot be made, and all solutions must therefore be maintained at optimum concentration and condition.

For highest-quality work, only the best grades of chemicals and the purest metal anodes should be used. Bargain basement products invariably yield bargain basement results and involve heavy expenditure in stripping and replating.

We acknowledge . . .

The generous cooperation of the following companies which have contributed material and assisted in the preparation of this report:

Alsop Engineering Corp.
Belke Manufacturing Co.
G. S. Blakeslee & Co.
The Bullard Co.
Commonwealth Engineering Co.
Crown Rheostat and Supply Co.
Detrex Corp.
Diversey Corp.
E. I. duPont de Nemours & Co., Inc.
General Chemical Div. Allied Chemical and Dye Corp.
General Electric Co.
Hanson-Van Winkle-Munning Co.
Industrial Filter & Pump Mfg. Co.
Landis Tool Co.
Magnus Chemical Co.
J. C. Miller Co.
The New Jersey Zinc Co.
N. Ransohoff, Inc.
T. Shriver & Co. Inc.
Sparkler Mfg. Co.
Special Chemicals Co.
The Udylite Corp.
United Chromium, Inc.
U.S. Galvanizing and Plating Equipment Corp.
Wagner Brothers, Inc.
Westinghouse Electric Corp.
Wyandotte Chemicals Corp.

Plating which will not pass inspection must be stripped off, as must all old plating on a replating job. Stripping is also required when temporary plating has served its purpose, as for carburizing or nitriding stopoff. Stripping may be performed by various treatments, depending upon the type of metal deposited and the basis metal employed. In some cases acids may be used by simple immersion, but this may involve some risk of attack on the basis metal. Some metals, such as chromium and tin, may be stripped by making the work the anode in an alkaline bath simliar to that used for ordinary electric cleaning, and using a piece of steel as a cathode; or in other words, plating the metal off the work. The cyanide soluble metals, such as brass, copper, and silver, may be stripped from steel in a similar manner, using a sodium cyanide solution. Nickel is generally stripped from steel or brass by making the work the anode in a fairly concentrated sulfuric acid solution to which a little glycerine is added to prevent attack by acid and pitting of the basis metal.

Tremendous quantities of water are used in plating operations, and purity and hardness can have considerable effect on the results obtained. In making up solutions, distilled water would be advisable but prohibitive in cost. Deionized water, however, serves equally well and can be obtained at very little expense by the use of a deionizer. Occupying little space and consuming no electric power, the deionizer is a useful adjunct to a plating room and should be of sufficient capacity to handle all the water used, except that used in the running water rinse tanks, cleaners, and acid pickles, where deionized water is unnecessary. It is, however, very desirable as the final hot water rinse to prevent staining of plated work, particularly in areas where the water is extremely hard.

In most cases electroplating has no appreciable effect upon the basis metal, but when highly stressed parts are involved there is some danger of their failure in service because of embrittlement. Embrittlement caused by etching cannot be relieved; that caused by hydrogen absorption can be completely relieved by soaking in boiling water or by baking in a furnace. The time required varies with the thickness of the plate and the temperature employed. Much of the embrittlement can be caused by the cleaning treatment used before plating. Pickling may liberate considerable quantities of hydrogen on the work, and where heavy pickling operations are performed prior to the regular plating cycle, inhibitors are sometimes employed in the acid pickle to reduce the danger of embrittlement. Generally speaking, however, embrittlement is not a major problem in most shops, and may be disregarded in the majority of cases, particularly when the work is purely decorative in nature or parts are not subjected to heavy stresses. In aircraft and similar work where structural strength is of the utmost importance, danger can be avoided by the methods described above.

PEN AND INK MARK GAGES

Code numbers are now applied with India ink, coated with Glyptol-Vinylite, and baked. It's fast, easy, and solved a renumbering problem

BY R. KADEN, Gage & Patrol Inspection Foreman
GAGE DEPT., KOLLSMAN INSTRUMENT DIV., SQUARE D COMPANY

Code numbers, applied to gage handles by pen and drawing ink, are protected by transparent Glyptol-Vinylite

Brush silver plating provides a white, glare-free background

Discoloration from overheating makes numbers less visible

AN UNORTHODOX method of affixing code numbers to gages has been employed by the Gage Department, Kollsman Instrument Division, Square D Company, to permit speedy installation of a revised gage-loan system without interruption of service.

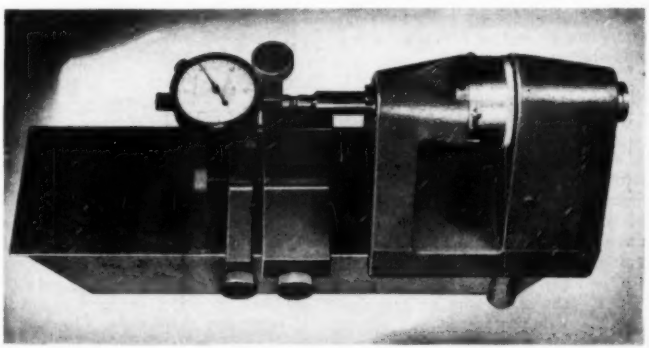
Because standard marking devices proved cumbersome and uneconomical for quantitative numbering of gages, the department investigated other techniques and determined to use the basic materials of most writing—pen and ink.

Whereas standard devices require skill in handling and their application is limited to a given type of material, this process is almost universally applicable. Three relatively simple steps—writing, coating, and baking—produce a usable product.

Writing on metal with ink presented no difficulties. Silver plating of surfaces by the brush method, thought necessary at first, was discontinued when it became apparent that elaborate preparations were superfluous. It was found that a sufficiently clean and greaseless background could be obtained by simply wiping the part with a rag. Because of its fluidity and adherence to metals, drawing ink was preferred as a writing medium. Its jet-blackness also provided good contrast. Training operators to write on metal required only a few minutes because it did not involve learning anything new, but rather discarding something old—the belief that writing has to be done on paper.

If gages were kept in showcases, the process could have ended right here. Unfortunately, that is not so. On the contrary, gages are subject to severe punishment from careless handling and exposure to abrasives and cutting fluids. Therefore, the writing had to be protected with a coating that would withstand such abuse. Of several preparations tried, a solution of Glyptol-Vinylite was found to be all-around best. Unlike waterglass, which hardened to a thick coat that chipped when struck with a hard object, Glyptol-Vinylite dried to a layer of about 0.0008 in., impervious to sharp blows. Tests showed that oils and cutting fluids encountered in machine shops did not affect the coating; nor was it found subject to wear from handling. As a matter of fact, the coating became harder and more durable with age.

To hasten this natural hardening process and to achieve quickly greater resistivity to wear, the coating was baked. Both a standard temperature-controlled oven and one fitted with infrared lamps



Indicator-tester combined Pratt & Whitney supermicrometer spindle and nut assembly and Brown & Sharpe surface plate. It permits rapid checking of all types of indicators. Dial indicator held as shown must be clamped lightly to avoid plunger friction. The dial was also coded with pen and ink

were used. Baking in the standard oven required one hour at 110 C. But with infrared lamps, a 25% reduction in baking time was realized. Good results were obtained by heating with one lamp for about 15 min. and with three for the remaining time.

Of the three steps in the process, only the first two demanded individual handling; the last step subscribed to quantity methods.

While the initial step proved the most time-consuming, coating caused no delay. Gage handles to be covered were dipped into a tank containing Glyptol-Vinylite and placed upright on peg-boards to allow excess solution to drain.

Although Glyptol-Vinylite is perfectly transparent, it was found that a brownish tint developed if the preparation is heated above 110 C. or if it is subjected to more than one infrared bulb at the beginning of the drying period. Baking time, on the other hand, did not have to be controlled closely.

Removal of the coating with acetone was found expedient in instances necessitating changes or corrections in marking.

Tips FOR TOP SHOP MEN

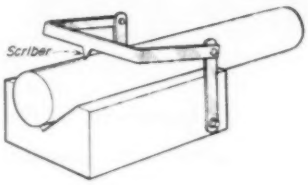
283 Watch out for the man who wants to run up the ladder, or who feels he is so over-competent in his job that he can handle a different and better one. The runner will misstep and fall; the over-competent may find himself in a job he doesn't really want—and at which he is not outstanding.

284 If a man is bored and careless with his present job, promotion may *not* be the answer. A man must be able to handle one job well before he merits advancement. If he can't settle into this one, he won't settle into the one up the line. Self-discipline must be learned the hard way.

285 The man who is impatient with the opinions of others, who resists authority or demands special privileges is usually a spoiled brat who didn't grow up. Until he does, he can't swing an executive job.

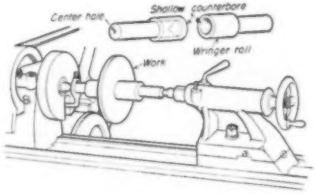
Short Cuts FOR THE SMALL SHOP

BY A. H. WAYCHOFF

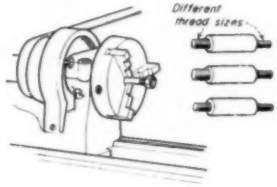


A SCRIBING attachment for the V-block helps to scribe lines accurately on round stock. Drill and tap the block. Make two connecting links. Then form up a stirrup-like piece with a good-sized triangular projection. Assemble the scriber to the block, then file the point so that it fits the bottom of the V. Remove the stirrup, harden and re-assemble.

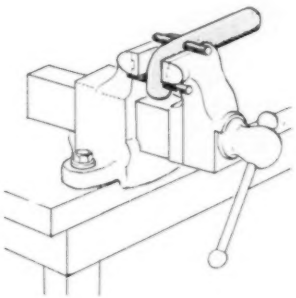
TEMPERING TONGS for small tools can be made of a piece of heavy wire or light drill rod. Bend to a hairpin shape, then form the ends as shown. Close a chain link or iron ring over the handle, so that the latter will be compressed and the tongs grasp the tool.



THIN DISKS can be turned conveniently by this stunt: Take a rubber-covered wringer roll from a washing machine. Saw apart about 2 in. from each end. Now counterbore these ends shallowly so the rubber covering projects slightly. Center the shaft ends. Chuck one roll shaft in the lathe, put the disk against the rubber-covered face, position the other roll end and bring up the tailstock center. The disk will be held securely between the rolls by the rubber facings, and the work will not be defaced while necessary turning operations are performed on it.

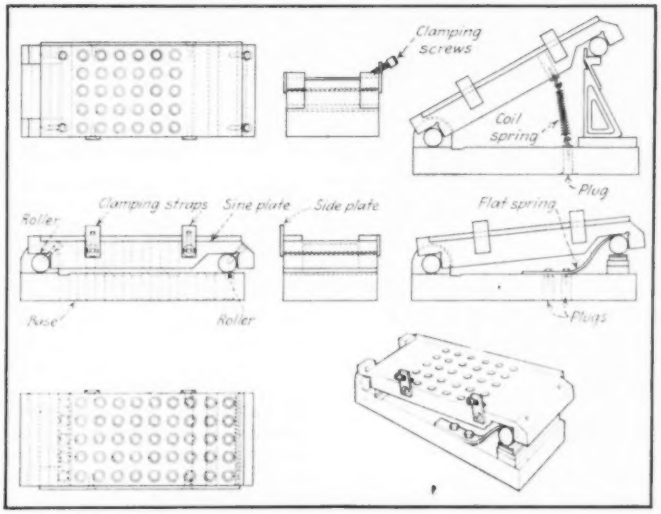


THREADED MANDRELS are a convenience at the lathe for chamfering or facing nuts and performing operations on disks or other parts with a tapped hole. To make the set, find assorted sizes of drill rod or bar stock, cut off pieces about 6 in. long and cut threads on each end. It is advisable to have threads of different sizes on the opposite ends of each mandrel so that the accessory is of maximum usefulness. Three or four such mandrels should suffice for most needs.



A NON-SLIP MANDREL for the vise is handy for forming various kinds of work. To make one, form a right-angle bend in a piece of heavy-wall tubing or bar. Drill two cross holes, one in the short leg of the mandrel so a pin through it can be hooked under the vise jaws, and the second hole above center so a pin through it will rest on top of the vise jaws. Hammering on the mandrel will not dislodge it in the vise jaws and require one to stop and take a new grip every so often.

Practical Ideas



Heavy Sine Plate Mounts Light Grinding Work

I HAVE INCORPORATED several unusual features in this sine plate that may be useful to other toolmakers, and although they cannot easily be added to existing plates, they may be considered for new plates.

First, the plate is constructed so that oversize rollers may be installed later after wear has made the original plate inaccurate. To accomplish this, the hole in the base must be reground to the larger size and the two lands on the under side of the plate must be ground and lapped. The center distance between the rollers must be held at the original 10 in., but this can be controlled by the grinding and lapping job on the lands of the plate.

Second, a vise or fixture or the work itself may be held to the plate either by the side plate and screws, or by bolts through the tapped holes in the plate itself. For holding a piece by its edges, the piece is pushed against the side plate and the screws, mounted at a slant in two straps on the other side of the sine plate are screwed down to clamp the piece.

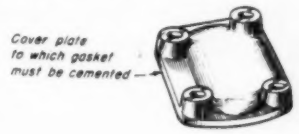
Third, two methods are available for holding the plate securely down on the gage blocks. A heavy coil spring or a flat spring can be attached to the base by flared-end plugs that fit into the chamfered holes in the base. The flat spring rests on the upper roller, and the coil spring is attached to the sine plate itself by means of a threaded plug in one of the tapped holes.

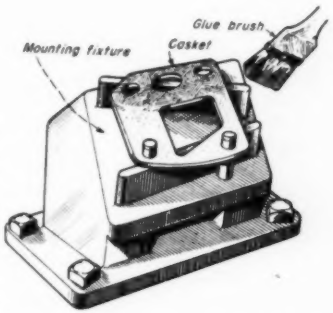
Work that must be ground at an angle can be mounted on the plate, but the operator must remember that the plate is a precision device and only light cuts should be taken. Milling is too heavy to be done with the plate as a base.

If the side plate and screws with their straps are removed, the sine plate may be used for determining angles for work mounted on an angle plate or fixture for milling. *Allan B. Nixon, Springfield, Mass.*

Olds Gasket Glued to Cover

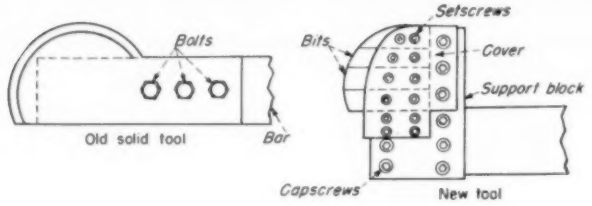
THE 1949 OLDSMOBILE V-8 engine has a ported cover plate that is held in place by four capscrews and requires a special gasket. To assure a tight joint around the ports, as well as around the outside, the gasket is cemented to the cap. This not only makes a tight joint, but also reduces fumbling during assembly.

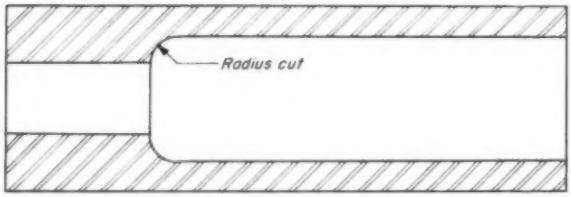




Since there is no guide to align the cover plate and the gasket before the capscrews have been assembled, a fixture was made to line the parts up and also hold the gasket for glue application. Only two pins were required because the four holes all have different center distances from each other.

Two ribs support the gasket about ½ in. above the fixture base so a finger can be slipped under the assembly to remove it. This also prevents excess glue from fouling the fixture. *Chester S. Ricker, Grosse Point, Mich.*





Multi-Bit Tooling Replaces Solid Tool for Boring Job

RUN-OUT in large (10 to 15 ft. long) cylinders caused by the original drilling operation made radius-ground form tools supported on a boring bar chip and break often. The uneven load caused by the run-out and the vibration caused by the 4- to 5-ft. overhang of the bar damaged the tools enough that they had to be replaced too frequently for economy. When it broke, the complete tool had to be replaced, including the large radius grinding job.

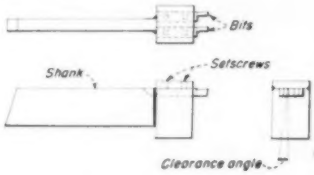
As a substitute tool, four standard bits were clamped in a holder, ground to the required radius, and mounted on the end of the boring bar. The new tooling had two important advantages. When only one bit was damaged it could be moved forward, rough ground to the radius, and then only a finish-grinding operation was required to form all the bits to the original shape. When all the bits had to be replaced, their low cost was a distinct advantage. All or only one of the bits could be replaced easily, and when the set became dull they could all be moved forward and reground to shape with a light grinding cut.

In addition, the extra support under the four bits that was provided by the block that was screwed to the boring bar reduced chipping, and the added weight cut down on vibration.

The bits were ground on two sides before being assembled so that they fitted close together. When they became too short for use in the boring setup, they could still be used in other shop jobs. *Arthur Silvestor, Niantic, Conn.*

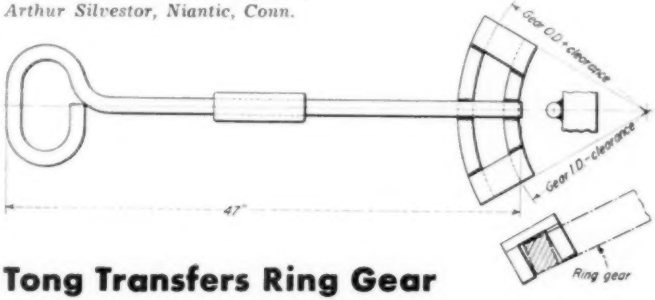
Double Tool Setup Cuts Double Threads

DOUBLE-SQUARE threads were cut on 1-in. stock, 8½ in. long with a double holder mounting two identical toolbits. The holder took about three hours to make, but saved time on a total batch of 200 parts.



The holder was welded together from a shank, a block and a top plate. The space for the two bits was milled out first, and then the top was tack-welded to it. Setscrew holes for clamping the bits were drilled and tapped later through the top plate.

Clearance was ground to suit the helix angle for four threads per inch. The setup was made by taking trial cuts and shimming the toolbits apart at the required positions. For extra rigidity, the shank of the holder was clamped directly to the compound. *Wilson A. Beard, Baton Rouge, La.*

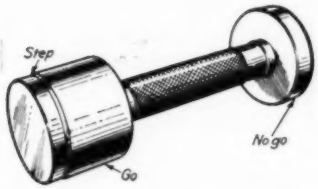


Tong Transfers Ring Gear

LARGE-DIAMETER ring gears had to be transferred from a hardening furnace, placed over a cast-iron hub, and moved to a quenching tank one at a time. This clumsy operation was done efficiently with a made-to-order hook that gripped the rings.

The long cold-rolled-steel bar, bent to an eye at one end, was welded to two curved plates which were held together by means of cross straps. An extra hand-hold was added along the shaft.

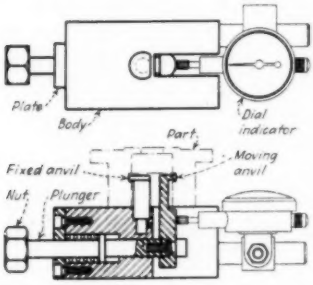
The operator wedges the ring into the hook end by simply picking the gear up at a slight angle. *Roger Isetts, Kenosha, Wis.*



Stepped Plug Gage Speeds Internal Grinding

INTERNAL GRINDING to fine tolerances can be made easier and faster if the operator has a stepped gage. The step in the end of the "go" portion of the gage is a few thousandths smaller in diameter than the "go" portion itself, and indicates that further grinding must be done with extra care.

Depending on the difference in diameters, the step might indicate that only a spark-out period is necessary to complete the work. In case the gage slips into the work as far as the "go" section, the operator then knows that he is finished. *G. R. Milner, Gainsborough, England.*



Adaptable Gage Checks Internal Grooves

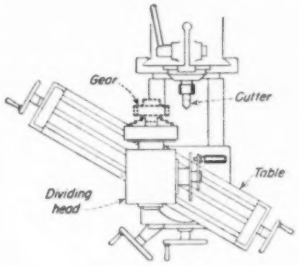
INTERNAL RECESSES, snap - ring grooves, and many other kinds of internal bored shapes can be checked with this adaptable gage for use on production lines and in machine shops. Any number of different sets of fixed and movable anvils can be installed in the gage.

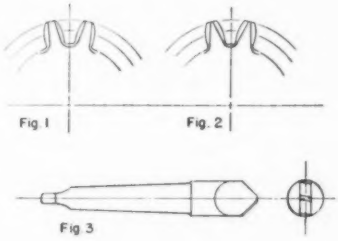
The body was bored out at one end to take a plunger that supports the moving anvil, held by a capscrew. The plunger itself was turned with a shoulder against which a compression spring worked. The spring is held in the body by a plate bolted to the end of the block.

At the other end the body was slotted for clearance of the moving anvil and the dial indicator, and a hole was drilled and tapped for a bar that supports the indicator through an adjustable clamp. The indicator rests against the surface of the moving anvil inside the slot.

The fixed anvil is located in a hole drilled in the body. The vertical position is controlled by the shoulder on the anvil, which is clamped in the body by a setscrew.

Other anvils for checking larger or smaller grooves can be machined to fit into the body, and the gage has unlimited use for accurate checking. The device can be calibrated by setting an inside micrometer to the required inside diameter, holding it over the anvils and setting the indicator to zero. Roundness of grooves can be checked by rotating the gage. *S. R. Welling, Racine, Wis.*





Beveled Edges on Spur Gears Smooth Out Meshing

SPUR GEARS mounted on change-gear boxes and other locations where they are meshed and unmeshed often will operate easier and will suffer less wear and produce less noise if the edge of each gear is beveled off on the mating sides. This can be done on a universal milling machine with a dividing-head setup.

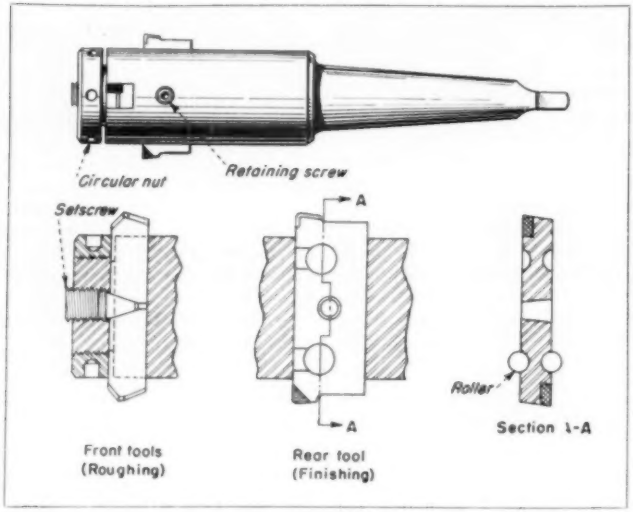
The table is turned at an angle of about 16°—suitable for gears with 20° pressure angles—and the dividing head is mounted and clamped down with its axis parallel to that of the machine spindle. A chuck mounted on the head grips the gear internally.

The cutter, Fig. 3, was made from a discarded twist drill, ground to a 90° included angle and with sufficient clearance. It is mounted in the spindle of the mill and the table is traversed from top left to bottom right in the illustration. The table stop must be located so that the cutter does not dig too deeply into the root between teeth.

Cutting action moves on the cutter from the outside edges to the tip, which means that the tooth crests are first milled and the cutter finally bevels the roots at the stopped position. Each traverse is made after the gear had been rotated so the cutter lies between two crests and will center in the root. This is done by means of sample cuts and the dividing head.

Fig. 1 shows teeth produced by this method. The bevel is nearly even all around the tooth profiles and the roots. A variation of this bevel, Fig. 2, can be produced by increasing the table angle to more than 16°.

The bevel angle is controlled through the included angle of the cutter, which can be altered to suit any requirements. *C. D. Mackinnon, Lanarkshire, Scotland.*



Squeezing Extends Length and Life of Boring Bit

ROUGH AND FINISH boring with one pass can be accomplished with the tool shown. It was made for work on cast-iron brackets where the holes were previously cored, but it is equally effective on steel if the bulk of the metal has first been removed by a twist drill.

The shank of the boring bar is made from low-carbon steel, machined to receive two square-section carbide-tipped bits for roughing and one double-end floating finished tool. The roughing cutters are adjusted by means of a tapered-end setscrew, which acts on the tapered ends of the two bits, and are locked by a circular nut on the end of the bar.

The finishing cutter is retained in the bar by the tapered-end screw through a hole in its center. This permits a small amount of float, which allows the bit to center itself. When this tool becomes dull, it can be extended by placing hardened rollers in the semi-circular grooves and squeezing them in a vise, causing the thin section of soft body metal to yield. This pushes the carbide tips forward sufficiently (2 or 3 thousandths) to allow sharpening again.

This process can be repeated a great number of times before the tool body must be discarded and the carbide tips brazed to a new shank. As much as 3/32 in. has been added to the tool in this manner before the shank showed any signs of splitting, and, as a matter of fact, the boring bar has been used with the semi-circular grooves split open with no loss of precision.

The tool should be employed with a high speed and a fine rate of feed, and produces holes that are truly circular, consistant within three tenths, and that have a fine finish. *G. R. Milner, Gainsborough, England.*

Drill-Rod Punch Cuts Costs

SIMPLE punching jobs can be speeded by the use of punches made from drill-rod stock and simple, setscrew-clamped holders.

Replacement of a broken punch is easy, and installation of the assembly is quickly done. *Stephen Penasack, Albion, N. Y.*

$25 *In addition to regular payment*

for the best

PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

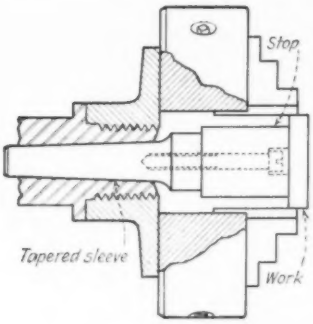
REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

72ND WINNER:

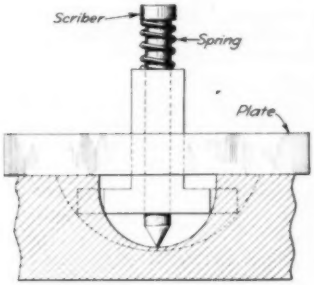
W. BRUNNER
Peening Increases
Reamer Life



Stop Locates Short Turnings

A TAPERED SLEEVE, mounted in a lathe spindle nose with a round block bolted to it, makes a good stop for short work that is chucked in the lathe. This stop is especially useful if the work has been faced once and the faced side is mounted against the stop.

The sleeve is turned to the taper of the lathe, tapped for the bolt, and pressed into the spindle. The stop itself is drilled and counterbored so the bolt head will not interfere with the work. The stop can be made to any convenient diameter and length. *Grover C. Russell, Needham, Mass.*



Scriber Finds Centers of Grooves and Cavities

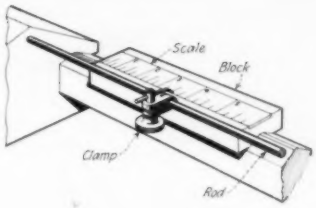
THIS SCRIBER can be employed to run centerlines down grooves and semicircular cavities when holes and slots must be located. The plate, drilled to take the collar, holds the collar and scriber vertical and makes movement of the device stable.

A tension spring soldered to both scriber and collar forces the sharp point down onto the work, while the collar drops down to contact both sides of the groove and center the scriber. Larger collars with scribers can be inserted for wide grooves. *Charles G. Rimmel, St. Louis, Mo.*

Lathe Reference Scale Speeds Turning Work

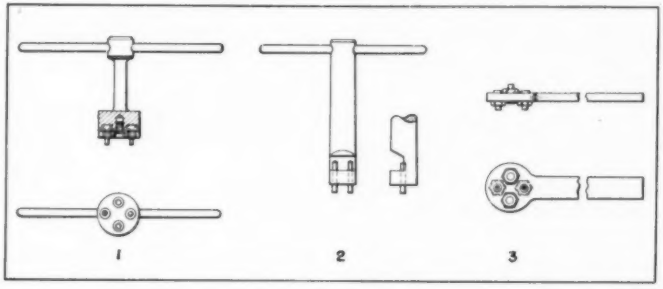
TURNING to shoulders, ending threads close to shoulders, positioning oil grooves, and practically all types of lathe jobs can be handled more accurately with this attachment I added to a 17-in. engine lathe. I have found it useful for most jobs in some way or other.

A 5/16-in. rod was inserted in a hole drilled lengthwise in the back end of the lathe carriage and was



locked by a setscrew through the top of the carriage. On this I mounted a surface-gage clamp which held a sharp pointer.

Right underneath the pointer, mounted on one way of the lathe, I located a block machined to the shape of the way and milled on top so a scale can be press-fitted onto the block. This provided a reference scale that was convenient and easy to read. *K. Clark, Lorain, Ohio.*

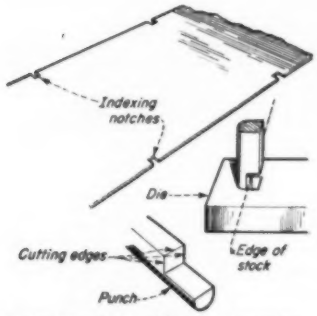


Three Peg-Spanner Wrenches Span Assembly Requirements

NUMBER-ONE spanner is a type included in engine-maintenance kits, and includes two extra pegs, made by turning down the ends of two socket-head capscrews to size. Thus, if one or both of the original pegs, made in the same way, breaks off, the wrench can be disassembled and the new peg can be set in place. The old peg's stub holds the plate of the wrench in position. The body of the wrench is drilled out and tapped to allow the cover plate to be held to the wrench by the spare pegs.

Number two wrench is for light duty, where peg holes are on a small pitch diameter. The cutaway in the wrench body is provided so broken pegs can be easily knocked out and replaced. In manufacture the peg holes are reamed for a press fit before the cutaway is machined.

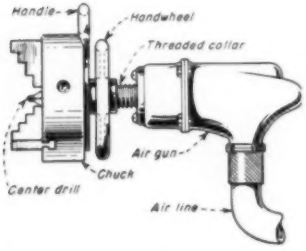
Number three wrench, for heavy-duty work, has two sets of pegs situated so that core plugs and caps that are nearly covered or are in hard-to-reach positions can be handled. The wrench body is cut from mild-steel plate with a torch and rough machined to shape. The holes are drilled and tapped to take the pegs, which are threaded. *R. B. Wolverhampton, Fallings Park, England.*



Strip-Steel Notching Permits Continuous Lithography

TO PRINT oil-filter covers on a strip of sheet-steel stock, the stock must be accurately located at each impression of the press. Four notches are punched simultaneously in the sheet just before it goes into the press. Since all edges must be sharp, and the strip cannot be deformed or it will not print uniformly, a backed-up punch, as shown, is employed.

This allows perfect register of the notches in the press. Indexing pins in the press locate in the notches and the strip is put under tension as the printing rollers pass over the steel. This process is both unusual and new, and permits continuous lithography on steel strip instead of sheet-by-sheet printing. *Chester S. Ricker, Grosse Point, Mich.*

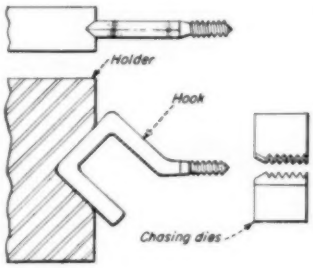


Chuck Centers Air Gun To Centerdrill Billets

LARGE ROUND STOCK and billets of Inconel are centered at both ends for customers so they can be set up in lathes and turned. This operation is done when the stock is nearly ready to leave the plant by a rig made up from a three-jaw universal chuck and an air gun.

The 9-in. chuck is mounted at the end of the gun by means of a threaded collar and a handwheel adjustment that can be rotated to feed the gun in and out of the chuck. A 1-in. center drill is fixed in the gun and the chuck is clamped on the end of the stock. As air pressure rotates the center drill, the handwheel is turned to feed the drill into the metal.

Stock up to 12 in dia. can be drilled in this manner. The rig is handled with a light hoist attached to the chuck at a handle. *K. C. Bland, International Nickel Co., Huntington, W. Va.*

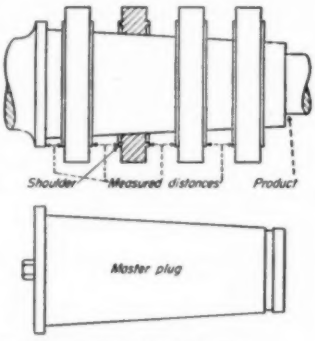


Thread Chasers Turn Chamfer On Lifting Hooks

HOOKS for lifting ingots are made with a threaded section on their ends for screwing into tapped holes in the ingots. Since square bar stock is used for the hooks, it must be turned down to a round section before it can be threaded.

After being bent to shape, the hooks are held by hand in a tailstock holder on a small lathe as they are advanced into the chasers held in a headstock fixture. The leading edge of each chaser is shaped to a bevel so that the square stock is turned down to a $^{3}/_{8}$-in. dia. from its original $^{3}/_{8}$-in. square section before it reaches the actual threading section of the chasers.

For this job sulfurized cutting oil is applied to the work to produce a good thread with uniform dimensions. *International Nickel Co., Huntington, W. Va.*



Ring Gages Check Taper Against Master Plug

TAPERED SECTIONS can be checked in production by a series of gaged rings if all tapers are the same and if the quantity of tapered parts justifies the expense and care needed to produce good rings.

A tapered plug, hardened and ground accurately to the required taper was checked originally with a dial indicator, both for the correct taper dimensions and for roundness. A ground disk was bolted to the end of the plug for a reference mark.

Four rings, ground all over to accurate dimensions and the shape illustrated, were mounted on the plug and the distances between them were measured with close accuracy. The shoulders turned on each ring served as measuring pads.

When the parts are measured, the rings are slipped onto the taper and these distances are checked against the original master readings. The advantage of this system is that a slight difference in the diameter of the tapered part at a given point will radically change the longitudinal distance, so high accuracy is possible. For this reason, the master plug and the internal tapers in the ring diameters must be accurate. *C. D. Mackinnon, Lanarkshire, Scotland.*

"Give us the tools . . ."

Now is the time to *FIGHT SOCIALISM* in Washington

Do we want to follow Britain down the economic skids?

We Americans face that question today. For we are being advised by Administration economists in Washington to take the course which destroyed Britain industrially. It is the temporarily easy course of cutting down expenditures for tools in order to have more things to consume right away.

The President's Council of Economic Advisers tells us we are spending too large a part of our national income on new tools and equipment. A larger share, they say, should go for goods and services used directly by consumers.

Before we take that advice, let us look at Britain. When the British once allowed their industrial plants and equipment to run down – they started down a dreary road to industrial stagnation and decay.

British industry once ruled the world. Low production costs enabled it to undersell all competitors. Efficiency gave British workers the highest living standards anywhere.

Now all that Britain has between it and economic disaster is pluck and American aid through the Marshall Plan.

The British people are living poorly – still on rations and in austerity. With practically everyone working, and working longer hours than we do in the United States, they cannot produce enough to pay for the raw materials and food they must import.

How did Britain get in this fix?

The story is complicated. British sacrifices in two wars play a tragic part in it. But another fact also stands out:

Britain began to go downhill even before World War I – when British industries allowed their plants and equipment to grow obsolete.

Once that process started, it grew steadily worse. By 1929 the share of Britain's national income being plowed back into capital investment had shrunk to less than two-thirds of what it had been twenty years earlier. We were putting twice as big a share of our national income into capital goods at this same time.

Skimping on capital equipment – on new plants and new tools – put the skids under industrial Britain.

World War II only speeded up a process already well under way.

continued on next page

British industry today shows the results of its failure to keep up to date. Here are three examples found by Dr. Laci Rostas, Britain's leading authority on measuring workers' productivity:

An American produces *four* times as much pig iron as his British counterpart.

He produces *more than four times* as many tires.

In all industry, on the average, an American produces almost three times as much.

The real reason is the American's better tools. The British are struggling with equipment that is, on the average, forty years old.

Britain once had a big head start in industrial equipment. But she let it slip away. And as it went, Britain's industrial and political leadership slipped with it.

How could British leaders have slept while all this happened?

This, too, is a complicated story. But parts of it stand out clearly:

1. *British business men put in more time perfecting cartels to avoid competition than they did in improving their plants and equipment to meet it.*

2. *British labor leaders concentrated on sharing the work and sharing the wealth—rather than doing the job necessary to have enough wealth to make the sharing worthwhile.*

3. *British governments taxed away the means to buy new equipment. By steadily increasing personal taxes, they undercut the* ability *of individuals to invest in new equipment. Finally, they took away the* incentive *to get new equipment by progressively taxing away any returns on it.*

4. *Farseeing socialists smiled all the while, knowing that as private industry more and more lacked the tools to do a progressive job, they would have their chance to run the country.*

Now, with Britain's fate in their hands, the socialists are trying desperately to stem the nation's economic decline by rebuilding its industrial plants and equipment.

They are making a little headway, but not enough. There are several reasons. One is that Britain must export most of the new equipment she can make. *Another major reason—increasingly important for her future—is that money needed to renovate Britain's run-down industry is taxed away to support welfare programs.* The (London) *Economist* grimly puts it this way:

"The importance of the function of saving has only been discovered now that the means of saving have largely been destroyed."

Our own Federal and State governments, too, have dangerously whittled away incentives. They have more than tripled tax rates on personal and corporation incomes in the last twenty years. Now, the President proposes to do more whittling.

If the United States is not to go Britain's way, we must preserve our incentives to save and to invest in industry.

If the United States is to progress, we must continue to build up our industries.

The President's Economic Advisers say we can slow down. But the McGraw-Hill survey of "Business' Needs for New Plants and Equipment," reported in the previous editorial in this series, produced facts to the contrary. It showed that industry *now* plans—*if it can get the money*—to spend $55 billion in the next five years for new plants and new tools. Moreover, it showed *industry's needs* for new facilities are large.

By cutting down the incentives to save, by giving soothing advice that we do not need to save so much, Washington is pushing us toward Britain's way—the route via industrial stagnation to socialization.

Before we skid too far, we should pull up short and ask ourselves: Do we want to go Britain's socialistic way?

There still is time to say, "No."

A complete report on our national survey, "Business' Needs for New Plants and Equipment," may be obtained by writing McGraw-Hill Publishing Co., 330 West 42nd St., New York 18, N. Y. This is the fifth editorial of a special series on industry's needs for new plants and equipment.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

NEWS OF METALWORKING

Fiat to Supply Motors and Gears for Austrian Auto

TURIN, ITALY—According to a deal just concluded between Italy's Fiat works at Turin and Austria's Steyr-Daimler-Puch A. G., Fiat will furnish Steyr with $2 million of motors and gears of their "1100" passenger model.

The Steyr plant will assemble this machinery into their own bodies. Overall technical assembling—such as construction of electrical wiring, fuel line and steering systems—will also be handled by the Steyr works.

Production at Steyr is scheduled to begin this summer with an output of 2,000 cars per year which will sell at about 18,000 schillings (nominally $1,800) per vehicle. The $2-million worth of motors and gears supplied by Fiat will be paid for by the export of Steyr tractors, steel and aluminum.

Shipbuilders Battle USMC Plan To Preserve Reserve-Fleet Bottoms

WASHINGTON—The Maritime Commission finds itself in a cat-and-dog fight with the U.S. shipbuilding industry. Main point of contention is USMC's proposal to operate Navy-owned drydocks for the preservation of reserve-fleet vessel bottoms.

Latest development is that the squabble has been thrown "out-of-court." Rep. (Judge) S. O. Bland, chairman of the House Merchant Marine and Fisheries committee, told the "warring parties" to leave his committee out of the fight—to settle it between themselves.

Reason for the fight in the first place is the necessity of putting preservative on the bottoms of the 2000 ships. During their life span each ship will have to be drydocked three times while the hull (to 3 ft. above the waterline) is sand-blasted down to grey metal and then sprayed with vinyl-resin coatings.

USMC estimates that the work done in commercial shipyards would cost $102 million against a total cost of $54 million in Commission-operated drydocks for the 20-year period. USMC would operate six navy-loaned floating drydocks—one each at the six reserve fleet sites. The $48 million saving would come in towing charges—fleet-site in one case being 300 miles from the nearest commercial yard.

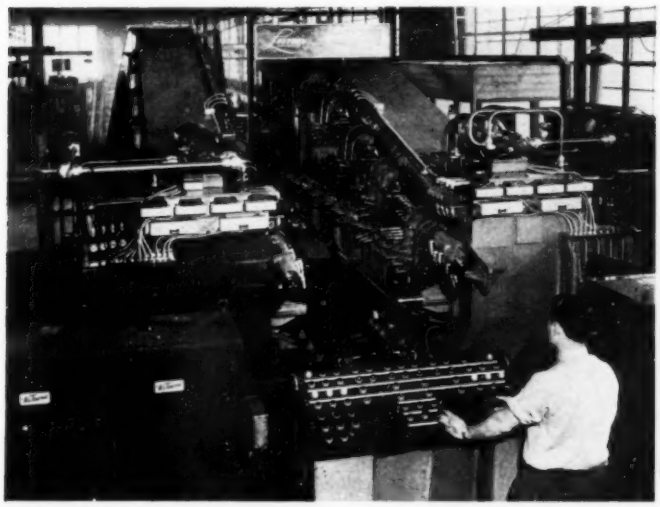
In an attempt to allay industry fears, USMC insists that absolutely no repairs would be undertaken at the government-operated facilities. However, a survey of work needed would be made the first time a ship was up for treatment. Bids would then be accepted from commercial shipyards who would do actual repair work.

In all, some 950 ships will need major repairs to bring the minimum "ready-reserve" up to strength. Some 250 ships turned in to the reserve fleet by the Navy need repairs "immediately," since they would be the first to be called in a national emergency.

Industry claims that USMC would start by making minor repairs and finally by doing all repair work. Industry also maintains it is entitled not only to repair work but to preservation of vessel bottoms as well. The first point USMC "categorically denies;" the second "constitutes a moot question."

The industry claims it needs all this business to survive. In answer, the commission says the industry cannot hope to maintain itself at its tremendous wartime level of expansion in any case, and further that the bulk of this expansion is represented by leased government facilities. Thus a return to a point somewhat above prewar would constitute no great hardship, but would rather be a healthy move. Main reason is that the active U.S. Merchant Fleet—and thus repair and replacement work—will probably stabilize at a little above its prewar level.

Industry points out that if they have to turn back the facilities they now lease from the government, the government would not only lose that revenue but would be saddled with the added expense of keeping them up.



***AUTOMATIC WELDER** built by Multi-Hydromatic Welding & Mfg. Co., East Detroit, will produce 72 roof truss sections per hour for the Lustron Steel Home. The largest fully automatic multiple spot machine known to have been built, it weighs 71,000 lbs., has 34 transformers, 68 welding guns.*

Morse, Ives Plan New Labor Bill

WASHINGTON — Here's how the closed shop may be dealt with in a new labor law:

Allow the closed shop where the employer is willing, but permit employers to refuse to bargain on the issue if they wish. Permit unions to force the discharge of members who are expelled for (1) being Communists or (2) engaging in wildcat strikes, as well as for non-payment of dues as under Taft-Hartley.

This is what Sen. Morse and Sen. Ives plan to include in a labor bill of their own when Taft-Hartley is brought up on the Senate floor.

For the second time this year, the Supreme Court has upheld the right of states to legislate against the closed shop and other forms of compulsory union membership. In January, it approved closed shop bans in Arizona, Nebraska and North Carolina. In its latest decision, it upheld a Wisconsin law which is more restrictive than the Taft-Hartley law in that it permits a union shop contract only if two-thirds of the workers approve. Taft-Hartley requires only a majority vote.

When it is not in conflict with Federal law, the states may regulate some "coercive conduct" by unions. This the Supreme Court said in upholding a ruling of the Wisconsin Employment Relations Board which declared as unlawful the conduct of an AFL union against Briggs & Stratton Corp. Within a few weeks' time, the union called 26 special meetings during working hours as a means of slowing production and pressuring the company in a wage dispute.

Crane User Standards

NEW YORK—Crane users now have a basis for obtaining uniform quality and performance in electric overhead traveling cranes.

Specifications have been prepared and published by the Electric Overhead Traveling Crane Institute for standard industrial-service cranes for medium-duty requirements, such as in heavy machine shops, assembly shops, and fabricating plants.

This information consists of five parts: general, trolley, bridge, girder, and electrical specifications. Free copies are available from the Institute, 74 Trinity Place, New York, N. Y.

Expand Aluminum Output

WASHINGTON—Austria's Ranshofen aluminum plant, which turned out an estimated 10,000 metric tons of aluminum in 1948, is expected to double that figure this year.

***DROP TANK** 17-ft. long is result of largest draw forming job ever attempted by Lockheed Aircraft Corp., Los Angeles, on its 1500-ton Clearing hydro-press. Due to size of tools and differences in contour of half shells, the punch is composed of four sections with middle section interchangeable to obtain the two skins required to form the P2V tank. Because the largest hydro-press at Lockheed was six feet too short for the tools, extensions were made and attached.*

Consider Large-Scale Pig-Iron Production in British Columbia

VANCOUVER—Plans by Consolidated Mining and Smelting Company of Canada Ltd. to thoroughly investigate possibilities of large-scale pig-iron production in British Columbia from its plant at Sullivan Mines in Kimberley, B. C., has been received with much interest by the steel and heavy-metal industry in Vancouver.

C. D. Hobbs, president of Vancouver Rolling Mills, whose $250,000 plant turns steel scrap into rods and shapes, say that "if the Consolidated Mining and Smelting Company converts pig-iron into steel billets, the rolling mill could easily be enlarged and production stepped up."

G. W. Sweny, president of the Vancouver Engineering Works and vice-chairman B. C. Division, Canadian Manufacturers' Association, said this was good news because, "production of pig-iron will not only be of assistance to presently established industries in the province, but should go far toward attracting other secondary industry to this territory."

Deputy Minister of Mines John Walker said at Victoria that Consolidated's dump pile at the Sullivan mine is the biggest iron deposit in British Columbia. It consists of iron pyrite and pyrhotite which could be turned into steel.

He pointed out that a full-scale blast furnace, turning out 1200 to 1400 tons a day, required 2400 to 2800 tons a day of high-grade iron ore. The present pile at Sullivan would supply such a furnace for 14 years.

A 1100-ton electric furnace, possibly being considered by the Consolidated Company, would produce 30,000 tons of pig-iron a year. This, said Dr. Walker, would supply the Vancouver market. The pig-iron can be converted to steel billets at Trail more economically than elsewhere in that conversion is simpler while the iron is hot and Consolidated has the power available for electric conversion.

Drill Chucks to be Made in England Through ECA-Guaranteed Deal

HARTFORD—Britain's dependence on imports of drill chucks should end with announcement by the Economic Cooperation Administration of a $400,000 guarantee to Jacobs Mfg. Co., Hartford, Conn., for machine tools and parts to manufacture drill chucks in England.

Arrangements have been made between Jacobs and Frank Guylee & Sons, Ltd., Sheffield, England, for production of Jacobs drill chucks there. With the ECA-guaranteed funds, Jacobs will acquire a 49% minority interest in the British firm.

In addition to an investment of cash, machine tools, special tooling and chuck parts, Jacobs will contribute manufacturing techniques and engineering services.

Distribution by British Subsidiary

Jacobs' British subsidiary, Jacobs Mfg. Co., Ltd., will handle distribution of the entire plant output through already established dealer outlets in England.

The plan calls for considerable extensions to the existing Guylee factory, which will about double its present capacity. The main plant, special machine tools, jigs and fixtures are being supplied by Jacobs, but quite a number of machines are also being obtained in England.

Twenty models of Jacobs plain bearing key-type chucks will be supplied, President Louis Stoner of the Hartford firm told AMERICAN MACHINIST. Production will start off by assembling, and then working backward to the finished article.

Work is about to begin on extensions to the factory, but in order to get quickly into production the British firm has taken temporary premises which will facilitate producing Jacobs chucks within six to seven months' time.

The British firm anticipates that full production, after completion of extensions to the factory, will be in about twelve to fifteen months. (But Mr. Stoner said that it will be about 18 months before the chucks will be made complete in England.)

The plant ultimately will supply a substantial part of United Kingdom requirements. When in full production it should produce about 130,000 drill chucks a year, with a large proportion for export, particularly to hard currency countries.

Charles H. Wilson Dies

NORFOLK, CONN. — Charles H. Wilson, who developed world industrial use of the Rockwell hardness tester for metals, died March 9 in Litchfield County Hospital, Winstead, at the age of 69. He was chairman of the board of the Wilson Mechanical Instrument Division of American Chain & Cable Co., Inc., Bridgeport. Mr. Wilson was known also for his work in developing pyrometers for measuring high temperatures in industrial processes.

***LABOR RELATIONS** plaque for "Outstanding Achievement in Industrial Relations" is accepted by George Gorton III (left), executive vice president and general manager of the George Gorton Machine Co., Racine, Wis., and by Carl Wohlin, union committee chairman, from Ola C. Cool, director, Labor Relations Institute of New York. The Institute's 1948 Award was given for outstanding harmony in the firm's industrial relations for the year.*

Bullard Acquires Universal Boring Machine Tool Line

BRIDGEPORT — The Bullard Co. has added to its line the products previously manufactured by the Universal Boring Machine Co., Hudson, Mass. According to E. C. Bullard, president, work will start immediately to transfer operations from Hudson to Bridgeport.

The Universal Boring Machine Co. was established in 1906, and a few years ago was purchased by National Can Co. Several Universal machines are now on order and will be completed in Bridgeport. Parts will hereafter be available from Bullard. Addition of this line of horizontal boring, milling, and drilling machines further expands the line of Bullard machines which is widely known in the metalworking field.

Although no announcement was made, National Can Co. will apparently retain the Universal plant and equipment in Hudson.

Slow Progress On Stockpiling

WASHINGTON — Contracts with ECA countries for U. S. purchases of strategic materials, to be paid for with 5% counterpart funds, have gone slowly so far—covering five commodities with a total contract value of less than $32-million. Deliveries lag even more, with only $7.7-million worth shipped by the end of 1948.

ECA has gone to some detail to show Congress why progress has been slow—supply shortages, dollar preference, prices, and ECA's inability to enter into long-term contracts are the main reasons.

The net deduction is that deliveries to U. S. stockpiles won't really start flowing until late in fiscal 1950 or early 1951 when results of current plans start to show in production figures.

When bookkeeping is finally caught up, counterpart funds deposited as a result of ECA's first year of operations will top the $4-billion mark. This will make over $200-million available to the U. S. in the 5% fund.

There is a shortage of critical materials for export as well as an unwillingness to sell what little there is for other than dollars. Shortage of strategics at dockside is a problem that bothers ECA planners.

***BRUCE F. OLSON**, vice president of Sundstrand Machine Tool Co. of Rockford, Ill. and its subsidiary American Broach* & Machine Co., Ann Arbor, Mich., was elected president and general manager at a recent meeting of the board of directors. He succeeds his father, the late Hugo L. Olson.*

Machinery Firm Sues Amtorg

NEW YORK—Status of a contract placed for machinery that subsequently became subject to export license will be determined at a jury trial April 25 when the case of United States Wall Board Machinery Co. and Amtorg Trading Corp. goes before the New York Supreme Court.

Amtorg, the Soviet trade agency organized here under American laws, is being sued for alleged repudiation and breach of three contracts placed on May 1, 1947, for $829,558 worth of equipment for plants in Russia to produce wall and hard board.

Amtorg contended the purpose of the contracts was frustrated by export license requirements, issued Mar. 1, 1948, after the contracts were made, which prohibited export of the equipment unless an export license was obtained. Amtorg has filed a counterclaim for $500,000.

The New York machinery firm contends that its contract was with Amtorg organized as a domestic corporation and that the terms of the contract have no relation to export licenses.

The machinery company argued that the performance of the contract was not prevented by the export license regulations of the Dept. of Commerce and that Amtorg could have foreseen that export controls might affect its ability to export the equipment.

Preventive Maintenance in Auto Plants Discussed at SAE Production Meeting

DETROIT — Whether preventive maintenance can be organized to keep production equipment running longer and raise plant efficiency was the problem threshed out by some 75 master mechanics and plant engineers at a panel discussion of the Society of Automotive Engineers national passenger-car, body and production meeting, March 8-10.

Meeting high-spot was the revelation that Cadillac uses time-studied preventive maintenance, and by so doing has reduced sharply the frequency of production-line breakdowns, while at the same time using 15 percent less maintenance labor.

Eighty percent of Cadillac maintenance workers carry out assigned tasks on work sheets, sign a statement at end of shift certifying the stated repairs, adjustments, or lubrications have been performed. Any breakdown attributable to wilful oversight or neglect is cause for discharge with union approval. Plant operating efficiency has been raised there, it was stated.

Don't Study User's Requirements

Automotive men stated that machine tool builders do not study the user's requirements in sufficient detail, especially with a view to reducing or easing maintenance tasks. In rebuttal, a machine-tool representative said that often machines are bought at a price, that to add extra features and redesign for a specific customer might be a waste of time, especially since the buyer looks at the price of equipment and tools, at the direct labor savings to be realized, but does not figure in relative maintenance costs.

Chip disposal took up a large part of the panel discussion. Dissatisfaction was expressed with attempts to incorporate chip handling equipment in machine tools. Too often, some said, it is next to impossible to get at a jammed or broken built-in system. Several asked that multi-station machines incorporate means to deliver chips to one disposal point.

Oldsmobile System Cited

Oldsmobile, it was brought out, has a system whereby drawings for all new fixtures are examined to determine spare part needs. They buy and stock such parts immediately. While the plan is expensive, it does prevent lengthy production breakdowns, and the likelihood of being caught with a large inventory of obsolete fixture parts is not great. Repair men make periodic visits to equipment to replace worn drill bushings, etc., according to experience factors.

Some plants have good results with underfloor or trenched chip conveyor systems to take chips out of machining areas. Others felt that they are paying a high price for repairs. But the mechanical chip conveyor was generally preferred to the pneumatic system.

Chips are Sluiced Away

To move steel chips and avoid quick failure of conveyors, one plant increased coolant now considerably to the point that chips are practically sluiced away.

While apparently an unavoidable necessity in some cases, underfloor chip conveyors have been found to limit machine rearrangement or expansion of departments. One firm sets its machines on gratings and can move them about at will.

The practice of using air hoses to blow chips off work, fixtures and machines was declared taboo because it blows chips and grit into bearings and onto slides, soon causing a maintenance problem.

Good preventive maintenance starts with proper lubrication procedures, it was agreed in discussions. Ford, Thompson Products and others use the lubrication instruction card at the machine, plus coded lubricants.

MEETINGS

Ohio Welding Conference, April 7-8, Ohio State University, Columbus.

American Society of Lubrication Engineers, April 11-13, Hotel Statler, New York.

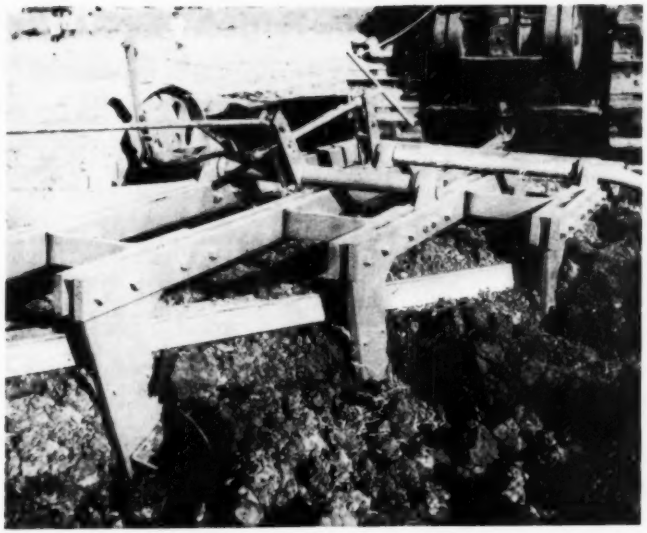
Western Metal Congress and Exposition, April 11-15, Shrine Convention Hall and Biltmore Hotel, Los Angeles.

American Management Assn., production conference, April 12-13, Waldorf-Astoria Hotel, New York.

Magnesium Assn., annual meeting, April 19-20, Edgewater Beach Hotel, Chicago.

Southern Machinery and Metals Exposition and **Southern Industrial Conference on Machinery and Metals,** April 25-28, city auditorium, Atlanta, Ga.

American Gear Manufacturer's Assn., June 6-8, The Homestead, Hot Springs, Va.



***HEAVY-DUTY PLOW** weighing two tons has been designed and built by Pashabai Patel & Co., Ltd., Bombay, for reclaiming wasteland in India's drive for increased food production. The firm has pioneered heavy-duty plow manufacture in India, and now produces five types, including this 5-point panbreaker.*

Canadian Elected President of Society of Tool Engineers

PITTSBURGH—Robert B. Douglas, president of Godscroft Industries, Montreal, was elected president of the American Society of Tool Engineers at the 17th annual meeting of the society held March 10-12. This marked the first time in the history of the society that a Canadian had been so honored.

Mr. Douglas succeeds Irwin F. Holland, superintendent of the tool and gage division of Pratt & Whitney Division of Niles-Bement-Pond Co., who becomes a director of the society. Herbert L. Tigges, vice president of Baker Brothers, Toledo, succeeds Mr. Douglas as first vice president of the society.

Other officers elected at the same time were: second vice president, J. J. Demuth of Sligo, Inc., St. Louis; third vice president, Halsey F. Owen, professor of industrial engineering, Purdue University; secretary, W. B. McClellan of Gairing Tool Co., Detroit; treasurer, George A. Goodwin of Master Electric Co., Dayton. Harry E. Conrad continues as executive secretary. Next national membership meeting of the society will be held in Montreal in October. Dates have not been announced.

More than 500 members and guests of the society attended the three-day annual meeting. Highlights of the technical program included visits to Pittsburgh district plants, including Westinghouse Airbrake Co. and Westinghouse Electric Corp. production departments, National Supply Co., James H. Matthews & Co., the Carbide Div. of Firth-Sterling Steel & Carbide Corp., and the Irwin Works of Carnegie-Illinois Steel Corp., the laboratories of Gulf Research & Development Corp. and of Westinghouse Electric Corp., and the New Kensington plant of Aluminum Co. of America.

Latham E. Osborne, senior operating vice president of Westinghouse Electric Corp. addressed the more than 350 members and guests at the annual dinner which climaxed the program. Mr. Osborne said that a tax reduction or even a simple pledge by the Government that tax rates will be maintained just as they are would stimulate business activity and provide greater national income.

The Federal Government, he said, does not need more money than it already is collecting through taxes and that "almost certainly" there will be a four billion dollar cash surplus at the end of this fiscal year.

Ever since the war ended the Treasury Department has consistently under-estimated national income and consequent tax revenue, he said, and "there is reason to believe that no adequate or just cause exists for increasing the burden on business or on individual taxpayers."

Bombay Firm to Build Tractors

BOMBAY, INDIA (McGraw-Hill World News)—Already near completion of its initial order for the first heavy-duty plows produced in India, a Bombay manufacturing firm currently is testing and modifying a prototype tractor for mass production.

Occupying a small surplus war plant, Pashabai Patel & Co., Ltd. since Jan. 1948 has delivered to the Indian Ministry of Agriculture more than 1,000 units of five types of plows and harrows designed for operation with tractors. Repeat orders from this source and from provincial governments are being negotiated.

All the equipment has been specially designed for India's hard soils by Nagindas Patel, the firm's chief engineer who has worked in both German and American plants. The emphasis has been on durability, for much of India's soil has never been plowed to the depth machines make possible, and in addition the majority of the plant's output is for reclamation of wasteland.

While the majority of the plant's 1,100 workers are turning out plows, a small developments section is devoting its attention to the tractor, shooting for possible production in 1950. Although Prime Minister Nehru himself has "christened" the prototype its design is far from finalized.

It will, however, be powered by an imported diesel engine of approximately 30 hp. (several makes are under test) and will feature a shorter than usual wheelbase to permit efficient use in the small farming plots usual in India.

Indian Diesel Firm Turns Out 75% of All Units

BOMBAY, INDIA (McGraw-Hill World News)—India's largest diesel engine manufacturer, Cooper Engineering Ltd. of Satara Road has reached a rate of production of some 70 units a month and is accounting for roughly 75 percent of the domestic production. Monthly output at the plant in the hills of central Bombay province averages 1,400 bhp.

The engines range up to a 256-bhp. model having four cylinders of 13½ in. piston diameter.

A wide variety of other products also are manufactured. Thirteen types of heavy plows and 12 types of light plows are produced, with annual output running 18,000 units a year. In addition, power-driven and bullock-driven sugar crusher production is about 700 units a year.

New Photo Floodlamp Brighter than Daylight

Development of an extremely powerful photographic floodlight, producing from 7 to 15 times the intensity of sunlight on a bright day, has been announced by General Electric's Lamp Dept., Cleveland.

The lamp will produce ample light for the taking of motion pictures at a speed of up to 8000 individual pictures a second, 500 times that normally used in the making of movies, according to G-E engineers.

Such high-speed photography is employed chiefly in connection with research, design, and development works in ballistics, aeronautics, industry, medicine and other fields to study such fast action as a bullet passing through glass, human muscles in motion, and the vibration of machinery.

The lamp resembles a sunlamp or heat lamp in shape. Its face is five inches in diameter and it throws a beam with an 18-degree spread, lighting a four inch square area at a distance of 18 inches. Requiring no auxiliary equipment, the lamp fits in an ordinary socket, and operates on normal voltages. It has a life of six hours.

***JAMES A. WRIGHT**, 56, vice president and general manager of Morse Twist Drill & Machine Co., New Bedford, Mass., died March 3 aboard a train enroute to a meeting of the Cutting Tool Institute at Buffalo, N. Y. For six months during the recent war, Mr. Wright served as assistant director of the machine tool division of the War Production Board.*

Auto Firms Work on Huge Army Trucks; Aim is Mobility Over Rough Ground

An invasion of the track-laying field by a new and radically different series of wheeled cross-country personnel-cargo vehicles is underway at Army Ordnance's Aberdeen Proving Ground. Several of the larger automotive manufacturers are building the prototype and experimental models.

The new vehicles, ranging from a ¾-ton four-by-four to a mammoth 25-ton eight-by-eight, are the result of an extensive post-war investigation into the maximum feasibility of wheeled vehicles in cross-country operation. The object is mobility, a combination of high road speed and maneuverability in rough terrain. Another aim is the elimination of dependence upon track-laying vehicles in rough ground.

New 5-Ton Truck Shows Promise

Most promising of the new trucks is a 5-ton 6 x 6 cross-country personnel and cargo carrier. Designed to implement the standard 2½-ton 6 x 6, which was the workhorse during the war, the 5-ton is important because it will negotiate rough terrain almost as easily as track-layer will, and do it faster.

To call the new vehicle a 6 x 6 is not stating the case. Its three sets of wheel arrangements (there are no axles) are almost equally spaced, with each wheel individually sprung. There are five differentials, one between each set of wheels, axlewise, and one between each pair of wheels. The differentials have an automatic locking device for each wheel which prevents one slipping tire from robbing traction from the set or the pair.

Steering is applied to the two front sets of wheels, rather than to just one set in standard vehicles. In some of the larger of the new models, the four front wheels are mounted in a bogie arrangement and the whole group is steered hydraulically. Springing is by torsion-rod, with shock absorbers on each wheel.

Tire Inflation Controlled from Cab

Tires on the prototype vehicles are a new design based upon those developed for the wartime DUKW. Much larger than the conventional truck tire and heavily ribbed for soft ground traction, the big casings can be inflated or deflated, to suit the terrain, from the truck cab.

Engine in the new 5-ton truck is the 210-hp. Ordnance air cooled unit. This power plant, one of the "multiple-unit" design developed for standardization of engines within the army, has six cylinders mounted in horizontal opposition. The engine is stood on end which allows considerable space saving in installation. Power application is through a hydraulic torque-converter transmission.

The conventional truck frame has been eliminated in the new models. A barge-like hull replaces the old-type frame, and the bulky differentials are contained within the body to provide a smooth under surface preventing snagging and dragging. Considerably higher clearance above the ground is obtained by dropping the drive rods down to the wheels from the differentials concealed in the body. Increased tire size on the new vehicles also makes for greater frame clearance.

Three-quarter Ton 'Junior Size'

The 5-ton is also being developed in a "junior" size, the ¾-ton 4 x 4. On a hard surface the vehicle has a 1½-ton rating, while in cross-country operations it has a ¾-ton rating. This vehicle is still in the pilot-development stage, however.

200 Manufacturers Will Exhibit At Western Metal Exposition

LOS ANGELES—Some 200 nationally known firms will exhibit at the Western Metal Congress and Exposition April 11-15 in the Shrine Convention Hall here.

Technical sessions and displays will emphasize recent developments in producing, fabricating and applying ferrous and non-ferrous metals. Exhibits will include metalworking equipment and processes, new and improved metals, heat-treating equipment and service, welding supplies and equipment, inspection aids, materials handling, metal cutting, machining equipment and tools.

More than 100 papers on ferrous and non-ferrous products will be delivered at technical sessions conducted by the American Society for Metals, American Welding Society, American Foundrymen's Society, American Institute of Mining and Metallurgical Engineers and Society for Non-Destructive Testing.

About 15 other societies will cooperate in the presentation of the Congress, including the American Society of Mechanical Engineers, the American Society of Tool Engineers and the Society of Automotive Engineers.

German Tools, Machines in Show

NEW YORK—Special machinery, tools and vehicles will be exhibited with other German-made products at the "Germany '49—Industry Show" April 9-24 at the Museum of Science and Industry, Rockefeller Center.

Some 500 firms and 22 different industry groups from the three Western German zones will be represented in the exhibition which is supported by the Joint Export-Import Agency of Frankfurt, Germany.

Object of the exhibition is to extend and strengthen trade connections between the United States and Germany. Some of the exhibitors will be on hand personally to represent their business interests in New York.

Besides machinery and tools, principal exhibits will include electrotechnical products, precision and optical goods, clocks and watches, jewelry, toys, wooden articles, porcelain and glassware, leather goods, textiles, arts and crafts articles.

A special information desk to handle inquiries on German-made machinery and equipment will be maintained by the Organization of German Machine Builders' Associations. Technicians and engineers will be available for consultation.

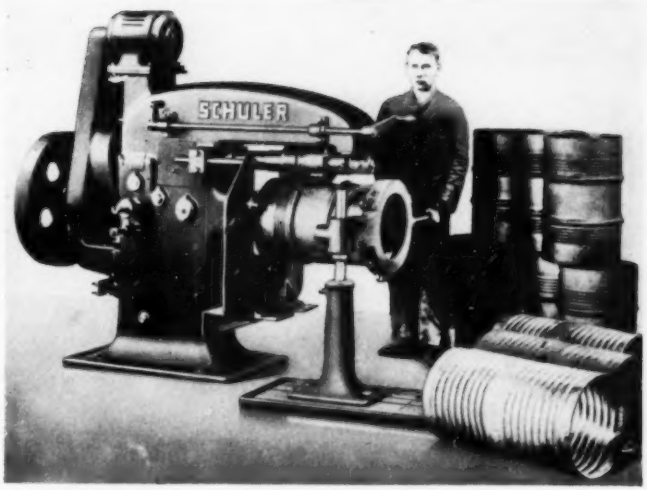
National Twist Drill Buys Standard Tool

CLEVELAND — Stockholders of the 68-year-old Standard Tool Co. here voted this month to sell the company's assets to National Twist Drill Co. of Rochester, Mich. Directors of Standard recommended acceptance of an offer of about $3 from the latter company.

Acceptance of the offer and liquidation of Standard Tool means disbursement of about $115 per share to present stockholders.

Enjoying profitable business during the war years, the company has been faced with a substantial reduction in the demand for its products since that time and also by competitors able to reduce their costs through improved facilities, the latter moves Standard was unable to meet.

Standard's present plant consists of several buildings some four and five stories high, resulting in high production costs. The firm makes drills, reamers and other metal cutting tools.



***DRUM MAKING** machinery capable of fabricating metal up to 1/16" thickness will be shown at the "Germany '49—Industry Show" at the Museum of Science and Industry, 30 Rockefeller Plaza, New York, April 9-24.*

Freight Car Orders Drop; But Backlog Still 7 Months

WASHINGTON—The railroads set something of a record last year by repairing 403,000 freight cars, and building 102,000 new ones.

Since the first of the year, however, the repair work has been allowed to slide a little and orders for new cars have dropped appreciably.

Although they still have a seven-month backlog of orders to fill, car builders have been unhappy about the slow-down in orders. They are even more unhappy over the fact that the roads have been ordering more cars from their own shops and less from the builders. Of the 85,974 cars on order March 1, the builders held contracts for 52,638 and the private railroad shops 33,336. This five-to-three ratio is in contrast with the 77-to-32 ratio of six months ago.

Deliveries during February totaled 10,315, the second highest production rate since early last year when the steel industry established a voluntary allocation for the job.

Railroad executives explain that they, like their customers, are watching and waiting, and feel that perhaps they should go a little easy on new orders for cars until the temporary slump (9.2% under Februray of 1948) is over. Also, they figure the builders' prices, which average about $5,000 a car, are a little high, and they can build the equipment more cheaply in their own shops.

The Association of American Railroads, however, feels that there should be another 25,000 boxcars ordered by the roads in addition to those already on order. Reason for this is that AAR expects a fairly tight supply situation to develop for this type car later in the year.

The expected demand for the "boxes" should develop because the average tonnage loading per car is dropping, thus "more cars will be needed to carry the same load as present." Also, a bumper wheat crop in the fall, on top of the dropping tons-per-car average, would put a strain on the supply, as has been in the case each fall for some years past.

Col. J. Monroe Johnson, head of the Office of Defense Transportation, made it pretty plain some time ago that if the railroads didn't come up with some more orders for cars, he would see to it that the voluntary steel allocation (for 10,000 cars a month) was dropped.

Dutch Cranes for Russia

The Netherlands will supply two floating revolving cranes with lifting power of from 125 to 1,500 tons, 50 sets of stationary diesel generators (100 kw) and 20 deep-drilling plants (drilling depth 100 meters), to the U.S.S.R. under terms of their recent trade and payments agreement.

Detroit

SOME SCHEDULES CUT . . . BUT FIRST QUARTER NEAR RECORD
FEWER CONVERSION DEALS . . . STEEL OUTLOOK BRIGHTENS

Automobile production seems to be strengthening after slippages at individual companies which came along toward the end of the winter. The companies which reduced their schedules include these:

Kaiser-Frazer Corp.: A shutdown through most of February, which ended early in March.

Hudson Motor Car Co.: A cutback from 972 cars a day to 800, achieved by halving assembly operations on the night shift. Hudson is one of the very few producers in the industry which is still using a second shift on final assembly.

Lincoln Motor Car Div.: Reduction in output from approximately 3700 units a month in January and February to about 2500 a month for March and the three succeeding months.

Packard Motor Co.: Modestly curtailed production during the last of February and the early part of March, along with some shiftings around in manufacturing departments.

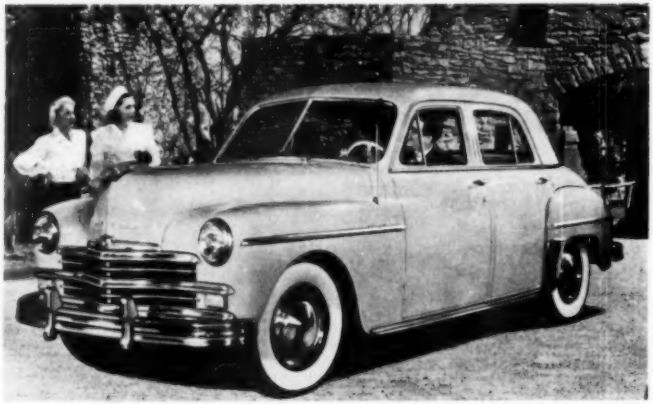
Willys-Overland Motors, Inc.: A shutdown in late February which was expected to last a few weeks, while inventory is taken and adjustments made in field stocks.

Federal Motor Truck Co.: Shutdown early in March.

Other Schedules Increased

As against these breaks in output toward the end of the winter season, mainly due to accumulations of finished vehicles in the field, other manufacturers had fairly optimistic anticipations and were moving to turn them into fact this month. Olds, for example, scheduled more new cars than in any previous postwar month. Ford schedules were enlarged, apparently by means of steel originally earmarked for Lincoln. The Chrysler divisions, reaching toward volume output after their changeover ebb points, had higher quotas in sight. Studebaker enlarged schedules.

All in all, the industry has done itself proud thus far in 1949, in spite of the momentarily slackenings along the lines. Indications are that when output figures are tabulated for the first quarter, the aggregate will be somewhere around 1,450,000 cars and trucks in all U. S. and Canadian plants. This would be a little short of the million and a half completions of the final 1948 quarter, but it would be the third best first quarter in history, exceeded only by 1941 and 1929.



***NEW PLYMOUTH** introduced to the public this month features lower and narrower body, with wider seats and greater headroom. In the special deluxe four-door sedan shown here, overall exterior dimensions are reduced but wheelbase lengthened to 118 inches and glass area is increased. Horsepower is raised to 97. Fenders are detachable for ease in repair.*

Steel promises to be somewhat more available in the second quarter, and with that bottleneck widened even a trifle, the industry total may prove even better than during the first three months. Steel conversion deals seem to be diminishing both in quantity and breadth. The auto manufacturers bought a lot of metal that way during the initial part of this year, but they are doing less of it almost by the week.

Lower Steel Quotations Asked

In this respect, note should be taken of the interesting new practice of Kaiser-Frazer Corp. As is well known, K-F has accumulated a considerable amount of steel tonnage sources under its own control. The Willow Run company is talking to suppliers, saying their high prices are due partly to the need of paying premium prices for steel, and advising them that K-F will guarantee them metal at published market prices if lower quotations can be made as a result.

Expect Price Reductions

Elimination of conversion steel for this producer's suppliers cannot help but lower costs, and the same holds true for other producers able to get their hands on finished mill runs. This may reflect itself later on in price reductions—something which will be seen more and more, industry wiseacres expect, as the retail market narrows.

Actually, car makers are able to get rid of just about all their production. The soft spots they encounter seem to be in territories where the dealers have sat and waited for business instead of going out after it. The emphasis today is on aggressive selling. That holds true, incidentally, not only for retail auto agencies, but also for suppliers—car makers report that their purchasing lobbies are more active than at any time since before the war, and the visitors are getting competitive in their proposals. This, of course, has been true for some time in the machine tool field, due to reduced order blanks.

New K-F Plant in Holland

WILLOW RUN, MICH. — Kaiser-Frazer Export Corp. has announced completion of the company's Dutch assembly plant, Nederlandsche Kaiser-Frazer Fabricken, N.V., in war ravaged Rotterdam. The plant site is Waalhaven Spit, a man-made finger of land jutting into the huge Rotterdam artificial harbor basin. Surrounded by water on three sides, ships carrying parts from Willow Run dock at the very door of the plant.

to help you...
BUY and SPECIFY GAGES

IT'S NEW

IT'S A CATALOG

IT'S A PRICE LIST

IT'S A REFERENCE MANUAL

NEW UNIFIED THREAD STANDARDS

IT'S A TEXT BOOK

116 pages include...

- Up-to-date Gaging Policy
- New Unified Thread Standard Gages
- Dry Seal Pipe Thread Gages
- Army and Navy Pipe Thread Gages
- Reversible Thread Gages
- Cylindrical Plug and Ring Gages
- Reversible Cylindrical Plug Gages
- AGD Snap Gages and Length Gages
- Special Gages of all Types

It's Wise and Thrifty To Increase Productivity With Sheffield Gages

MAIL TODAY

AM-4 *Please send your new 116-page Gage Handbook*

Name_____
Position or Title_____
Company_____
Street_____
City_____ Zone____ State____

the Sheffield corporation
Dayton 1, Ohio, U.S.A.

Another First in precision:

*THERMO-GUARD GAGE BLOCKS

lowers cost of carbide blocks and increases precision of steel blocks

***Patent Applied For**

*Standard equipment at no extra cost in A blocks; small additional charge in B blocks.

Tool makers who work in split tenths and in dimensions above 1" have always been aware of the variables introduced by body heat and the necessity for allowing blocks to "cool off" after handling and before making an extremely critical inspection.

Tests have shown that heat from the hands causes a 4" steel block to grow .00005 in 15 seconds.

To avoid that error Webber has added THERMO-GUARDS to all 2", 3" and 4" steel and carbide tipped blocks.

Thus delays and difficulties due to variables in temperature are avoided.

It is another of a formidable list of Webber firsts that has added speed and precision to gage block inspection. *Write for details.*

A roll call of Webber Firsts, 1929-1949

FIRST: Low cost gage blocks that put precision within reach of smallest shops.

FIRST: Wear blocks added to standard sets at no extra cost.

FIRST: Easy view tilt case for quick identification of blocks.

FIRST: Carbide tipped blocks with continuous unbroken gaging surface.

FIRST: Angle Blocks for the direct measurement of angles in degrees, minutes and seconds.

FIRST: TRUE SQUARE in U.S.A. with all four gaging surfaces at precisely 90° to adjacent sides.

FIRST: THERMO-GUARD insulates 2", 3" and 4" gage blocks from body heat.

WEBBER GAGE COMPANY

12901 Triskett Road **Cleveland 11, Ohio**

Largest exclusive manufacturer of precision gage blocks

Webber Gage Company, makers of standard carbide gage blocks, angle blocks, true square, wear blocks, special size blocks, heavy duty blocks and fixtures.

Webber

MICRO-ACCURATE GAGE BLOCKS and FIXTURES

American Machinist REFERENCE BOOK SHEET

Estimating Upset Forgings—I

By ALBERT P. BERBERICH
Assistant Superintendent, U. S. Cloth Cutting Machine Company

To estimate the material required in upset forgings and to calculate cavities of upsetting dies, the accompanying table was calculated for stock diameters from ⅛ to 4 in.

Entries in the table cover the stock diameter d and the stock length L_1, Fig. 1, necessary to make the 3rd-pass upset with dimensions D_4 and L_4, Fig. 4, plus the dimensions of the 1st- and 2nd-pass upsets, Figs. 2 and 3. Values of diameter and upset for the three passes are calculated on the basis that original volume of material being worked does not change, providing proper stock temperature and operator skill are maintained. Under such conditions there will be no loss of stock if fillets of equal radii, Fig. 8, are used.

In the forging industry, it has been accepted by many that the diameter of a given upset may not exceed 1.3 times the diameter of the preceding upset. But it has been demonstrated that once the diameter of upset reaches 2 in., after the first pass, succeeding upset diameters may be up to 1.5 times as great. Hence, for stock from 1¼ to 1½ in. diam., an optional value of $D_4 = 2.52d$, Fig. 5, and for stock of 1⅝ in. and larger, the optional value of $D_3 = 1.95d$, Fig. 6, and the optional value of $D_4 = 2.92d$, Fig. 7. Optional values of D_3 and D_4 are given in the tables on the line below the entries for conventional increase in diameter by the 1.3 ratio.

Formulas for length of upset, based on the conventional 1.3 increase in diameter, are:

$$L_3 = 1.69\,L_4 \quad \text{or} \quad L_2 = 0.591\,L_1$$
$$L_2 = 1.69\,L_3 \qquad L_3 = 0.591\,L_2$$
$$L_1 = 1.69\,L_2 \qquad L_4 = 0.591\,L_3$$

If optional values are used, the formulas for upset length are:

For 1¼ — 1½ in. stock:

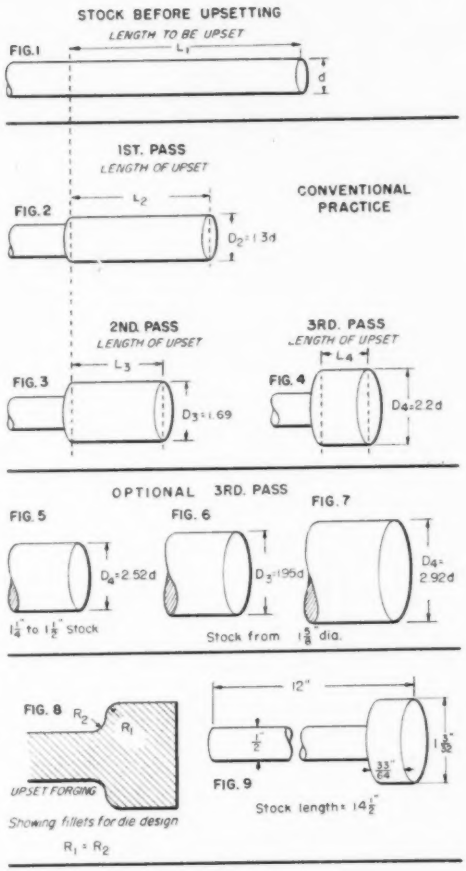
$$L_3 = 2.34\,L_4 \quad \text{or} \quad L_2 = 0.591\,L_1$$
$$L_2 = 1.69\,L_3 \qquad L_3 = 0.591\,L_2$$
$$L_1 = 1.69\,L_2 \qquad L_4 = 0.426\,L_3$$

For 1⅝ in. stock and larger:

$$L_3 = 2.24\,L_4 \quad \text{or} \quad L_2 = 0.591\,L_1$$
$$L_2 = 2.24\,L_3 \qquad L_3 = 0.444\,L_2$$
$$L_1 = 1.69\,L_2 \qquad L_4 = 0.444\,L_3$$

Problem: To upset a flange ½ in. thick, Fig. 9, on the end of ½ in. bar, the forging to be 12 in. over-all. What is the length of stock required?

Solution: See table, page 143. For ½-in. bar, the nearest value of L_4 to ½ in. is 33/64 in. and the corresponding value of $D_4 = 1\ 3/32$ in. To find L_1, refer to the same line in the table and read 2½ in. under the column headed length to be upset. Add this to the forging length to get 14½ in. as the length of the original bar required for the piece.



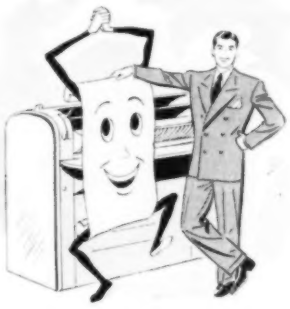
Month after Month–
OZALID materials are UNIFORM!

SHIPMENT AFTER SHIPMENT, month after month, Ozalid materials are in balance!

They are constant in printing speed, in reprint speed, in image color and image density, and in dozens of other characteristics *which give peak efficiency to an Ozalid operation.*

This uniformity means that the Ozalid operator's time is spent in feeding material into the machine, rather than testing, retesting... then starting all over!... to learn the differing characteristics of each new package of sensitized material.

In addition, Ozalid materials show scrupulously maintained *superiority*. Scientific tests on every batch of Ozalid materials assure an ideal balance of physical strength, higher resistance to fading, covering power, and *keeping qualities* unmatched by any other diazo-sensitized materials.



Ozalid's continuous laboratory control comes free with every package of Ozalid materials! And—Ozalid's nation-wide technical organization is ready to help you in any part of the country.

NOTE TO NON-USERS OF OZALID:

Do you know the story of America's Simplest Business System? Ozalid duplicates anything drawn, typed, or written in as little as 25 seconds! Ask for FREE booklet outlining the many ways in which Ozalid can save you time and dollars. Consult your classified directory or write to...

OZALID Johnson City, N. Y. Dept. 47
A Division of General Aniline & Film Corp.
"From Research to Reality"

DON'T COPY!...USE OZALID!

Estimating Upset Forgings—II

STOCK			1st PASS		2nd PASS		3rd PASS	
DIAM.	LENGTH to UPSET	ORIG. VOLUME	UPSET DIAM.	UPSET LENGTH	UPSET DIAM.	UPSET LENGTH	UPSET DIAM.	UPSET LENGTH
1/8	1/4	0.0031	5/32	5/64	7/32	5/64	9/32	5/64
"	5/16	0.0038	"	17/64	"	7/64	"	7/64
"	3/8	0.0046	"	19/64	"	9/64	"	9/64
"	7/16	0.0053	"	21/64	"	11/64	"	11/64
"	1/2	0.0061	"	23/64	"	13/64	"	13/64
"	9/16	0.0069	"	25/64	"	15/64	"	15/64
"	5/8	0.0076	"	27/64	"	17/64	"	17/64
"	11/16	0.0084	"	29/64	"	19/64	"	19/64
"	3/4	0.0092	"	31/64	"	21/64	"	21/64
1/4	1/2	0.0245	9/64	15/64	11/32	15/64	13/64	15/64
"	5/8	0.0306	"	19/64	"	19/64	"	19/64
"	3/4	0.0368	"	23/64	"	23/64	"	23/64
"	7/8	0.0428	"	27/64	"	27/64	"	27/64
"	1	0.0490	"	31/64	"	31/64	"	31/64
"	1 1/8	0.0551	"	35/64	"	35/64	"	35/64
"	1 1/4	0.0612	"	39/64	"	39/64	"	39/64
"	1 3/8	0.0674	"	43/64	"	43/64	"	43/64
"	1 1/2	0.0735	"	47/64	"	47/64	"	47/64
5/16	3/4	0.083	21/64	5/16	13/64	5/16	15/64	5/16
"	15/16	0.103	"	3/8	"	3/8	"	3/8
"	1 3/16	0.124	"	43/64	"	43/64	"	43/64
"	1 5/16	0.145	"	47/64	"	47/64	"	47/64
"	1 1/2	0.165	"	51/64	"	51/64	"	51/64
"	1 11/16	0.186	"	1 3/64	"	55/64	"	55/64
"	1 7/8	0.207	"	1 7/64	"	1 7/64	"	1 7/64
"	2 1/16	0.228	"	1 11/64	"	1 11/64	"	1 11/64
"	2 1/4	0.248	"	1 15/64	"	1 15/64	"	1 15/64
3/8	1	0.196	31/64	15/64	25/64	15/64	1 3/32	15/64
"	1 1/4	0.245	"	19/64	"	19/64	"	19/64
"	1 1/2	0.295	"	23/64	"	23/64	"	23/64
"	1 3/4	0.343	"	1 3/64	"	27/64	"	27/64
"	2	0.393	"	1 7/64	"	31/64	"	31/64
"	2 1/4	0.441	"	1 11/64	"	35/64	"	35/64
"	2 1/2	0.491	"	1 15/64	"	39/64	"	39/64
"	2 3/4	0.540	"	1 19/64	"	43/64	"	43/64
"	3	0.589	"	1 23/64	"	47/64	"	47/64
7/16	1 1/4	0.383	13/16	47/64	1 3/16	47/64	1 3/4	47/64
"	1 5/16	0.479	"	59/64	"	59/64	"	59/64
"	1 7/16	0.575	"	1 7/64	"	1 7/64	"	1 7/64
"	1 9/16	0.670	"	1 15/64	"	1 15/64	"	1 15/64
"	1 11/16	0.766	"	1 23/64	"	1 23/64	"	1 23/64

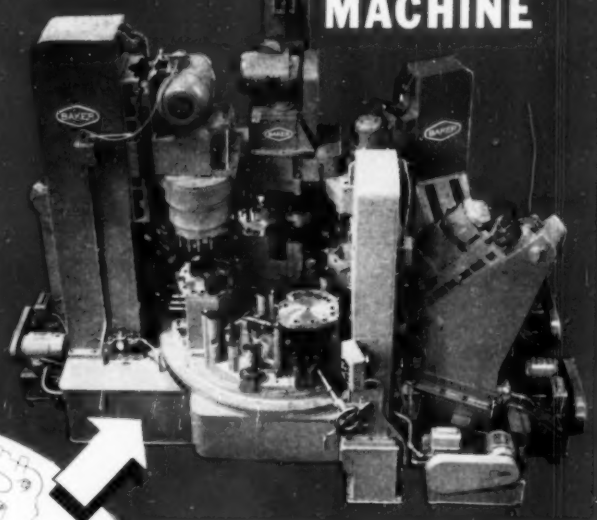
STOCK			1st PASS		2nd PASS		3rd PASS	
DIAM.	LENGTH to UPSET	ORIG. VOLUME	UPSET DIAM.	UPSET LENGTH	UPSET DIAM.	UPSET LENGTH	UPSET DIAM.	UPSET LENGTH
5/8	2 5/16	0.861	13/16	1 1/32	1 1/16	31/32	1 3/4	37/64
"	3 3/8	0.958	"	1 7/32	"	1 7/32	"	1 7/32
"	3 7/16	1.050	"	1 7/64	"	1 7/16	"	1 5/64
"	3 3/4	1.120	"	1 9/32	"	1 9/32	"	1 9/32
3/4	1 1/2	0.662	31/32	37/64	1 1/64	39/64	1 11/32	5/16
"	1 7/8	0.828	"	1 7/64	"	1 7/32	"	1 7/32
"	2 1/4	0.990	"	1 31/64	"	1 35/32	"	1 5/32
"	2 5/8	1.060	"	1 15/32	"	1 25/32	"	1 1/2
"	3	1.330	"	1 15/32	"	1 13/64	"	1 3/4
"	3 3/8	1.490	"	2 1/16	"	1 5/16	"	1 11/16
"	3 3/4	1.650	"	2 5/64	"	1 5/16	"	1 9/64
"	4 1/8	1.820	"	2 5/64	"	1 29/64	"	1 27/32
"	4 1/2	1.980	"	2 13/64	"	1 9/16	"	1 29/32
7/8	1 3/4	1.050	1 1/64	1 3/32	1 1/32	39/64	1 15/64	23/64
"	2 3/16	1.320	"	1 15/64	"	49/64	"	39/64
"	2 5/8	1.580	"	1 31/64	"	59/64	"	39/64
"	3 1/16	1.810	"	1 31/64	"	1 1/16	"	47/64
"	3 1/2	2.100	"	2 1/16	"	1 1/32	"	55/64
"	3 15/16	2.370	"	2 5/16	"	1 3/8	"	13/16
"	4 3/8	2.630	"	2 37/64	"	1 17/32	"	29/32
"	4 13/16	2.890	"	2 15/16	"	1 15/64	"	1
"	5 1/4	3.160	"	3 3/32	"	1 37/64	"	1 1/32
1	2	1.570	1 1/64	1 5/16	1 1/16	43/64	2 1/64	1 1/32
"	2 1/2	1.960	"	1 31/64	"	7/8	"	39/64
"	3	2.360	"	1 25/32	"	1 7/64	"	5/8
"	3 1/2	2.750	"	2 5/16	"	1 15/64	"	25/32
"	4	3.140	"	2 23/64	"	1 17/32	"	55/64
"	4 1/2	3.530	"	2 29/32	"	1 37/64	"	19/16
"	5	3.920	"	2 61/64	"	1 3/4	"	1 1/32
"	5 1/2	4.320	"	3 17/64	"	1 15/16	"	1 5/64
"	6	4.710	"	3 49/64	"	2 1/32	"	1 19/64
1 1/4	2 1/4	2.240	1 7/64	1 11/32	1 7/32	51/64	2 1/32	1 1/32
"	2 13/16	2.800	"	1 45/64	"	59/64	"	1 7/64
"	3 3/8	3.360	"	2	"	1 1/16	"	1 5/64
"	3 15/16	3.910	"	2 3/16	"	1 13/64	"	1 1/16
"	4 1/2	4.470	"	2 45/64	"	1 31/64	"	1 5/16
"	5 1/16	5.030	"	3 3/64	"	1 3/4	"	1 3/64
"	5 5/8	5.590	"	3 11/32	"	1 13/32	"	1 11/64
"	6 3/16	6.150	"	3 37/62	"	2 1/16	"	1 9/32
"	6 3/4	6.700	"	4	2 25/64	7/8	"	1 13/32
1 1/4	2 1/2	2.760	1 5/8	1 7/64	2 7/64	7/8	2 47/64	19/32
							3 3/32	39/64

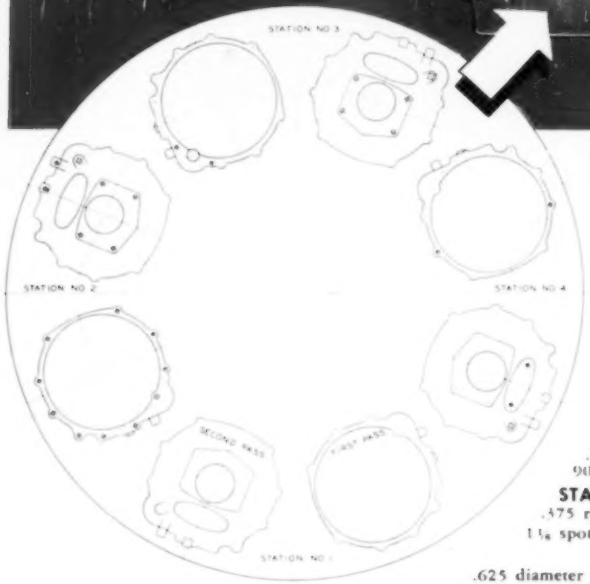
Cut Handling Costs... Increase Production!

BAKER MULTI-OPERATION MACHINE

LESS OPERATOR FATIGUE

Special 4 station production machine performs multiple operations on clutch housings for large auto manufacturer. Each unit of machine supplied with separate outside power pack hydraulic feed unit. Consult Baker engineers regarding your production problems.





LOAD, RELOAD & UNLOAD ONE CLUTCH HOUSING

STATION No. 1 Load, Reload and Unload one part

STATION No. 2 1st Pass
$17/32$ spotdrill 1 hole
$27/64$ drill 7 flange holes
$23/64$ drill 2 flange holes

2nd Pass
$23/64$ drill 4 holes for $7/16$-14 Tap
$19/32$ drill 1 hole for .625 ream
$5/16$ drill 2 angle holes

STATION No. 3 1st Pass
$1\frac{1}{4}$ diameter spotface .625 hole
Combination $5/16$ drill 2 holes
$23/64$ drill side hole for $7/16$-14 Tap

2nd Pass
.753 counterbore .625 hole
90° chamfer 4 holes for $7/16$-14 Tap

STATION No. 4 1st Pass
.375 ream 2 holes
$1\frac{1}{4}$ spotface $23/64$ side hole

2nd Pass
.625 diameter ream 1 hole
.199 diameter drill 2 angle holes for $1/4$-20 Tap

BAKER BROTHERS-Inc. TOLEDO OHIO
DRILLING - BORING - TAPPING AND KEYSEATING MACHINES

Straight Cut-Off Blades

An American Standard ASA B5.21—1949 has been approved by the American Standards Association. This standard was developed by the American Society of Mechanical Engineers, 29 West 39th St., New York 18, and extra copies will be available from that Society.

This standard covers straight cut-off blades for lathes and screw machines. The details are:

Definition. A straight cut-off blade is a flat piece of tool steel generally having a cross-section in the shape of a rectangle, trapezoid, or trapezium when the cross-section is taken at right angles to the over-all length. There various shapes are provided to fit the different holders and clamping devices in general use. The blade is furnished unsharpened, heat-treated, and cut to length. The cut-off blade is made ready for use by grinding one end to the proper rake, clearance angles, etc.

Size. Nominal size of the straight cut-off blade is expressed in the order named: Width, height (including clamping bevels if any), and over-all length, such as 1/16x½x4½ in.

Clamping Bevel. Clamping bevels may be provided at the top and base surface of straight cut-off blades to facilitate clamping in the holder or clamping device.

Top. The top surface of a straight cut-off blade is the surface at the thickest portion of the blade.

Base. The base is the surface of the straight cut-off blade supported in the holder or clamping device that resists the tangential pressure of the cut.

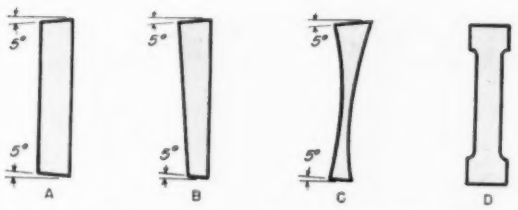
Height. The height of a straight cut-off blade is the greatest dimension between the top and base surface of the blade.

Width. The width of a straight cut-off blade is the measurement across the top surface of thickest portion.

Length. The length of a straight cut-off blade is the over-all length.

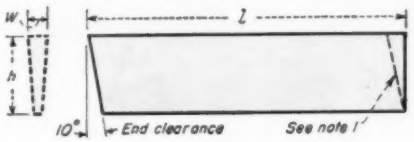
Side. The sides of the cut-off blade are the surfaces connecting the top and base of the blade. They may be parallel, beveled, concaved, or channeled.

End. The ends of a straight cut-off blade may be square with the top and base surfaces, or they may be furnished with a clearance of approximately 10°.



OPTIONAL SHAPES FOR CUT-OFF BLADE STOCK

A Without Side Clearance
B With Straight Side Clearance
C With Concaved Side Clearance
D With Channeled Sides (Heavy-Duty) Only Made 1 In. Height or Greater



DIMENSIONS OF STRAIGHT CUT-OFF BLADES

WIDTH (W)	HEIGHT (H) X LENGTH (L)					
1/16	1/2 x 4 1/2*	11/16 x 5	13/16 x 6	.....	.....	.....
3/64	1/2 x 4 1/2	.....	.....	.....	.....	.....
1/32	1/2 x 4 1/2*	11/16 x 5	13/16 x 6	.....	1 x 6 1/2	.....
1/8	1/2 x 4 1/2*	11/16 x 5*	13/16 x 6	.....	1 x 6 1/2	.....
5/32	.....	11/16 x 5*	15/16 x 6	.....	.....	.....
3/16	.....	11/16 x 5*	15/16 x 6	7/8 x 6*	1 x 6 1/2	1 1/8 x 6 1/2*
1/4	.....	.....	11/16 x 6	7/8 x 6*	1 x 6 1/2	1 1/8 x 6 1/2*

All dimensions are given in inches

Cross-sectional shape and dimensional limits shall be in accordance with the manufacturer's standards.

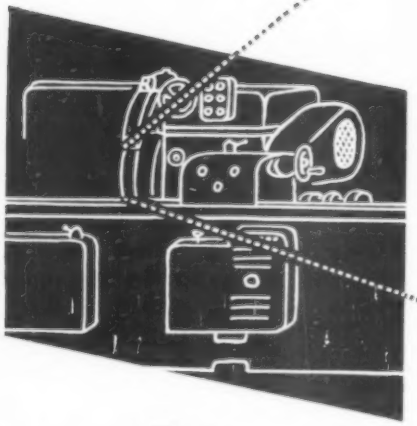
Height dimensions are nominal.

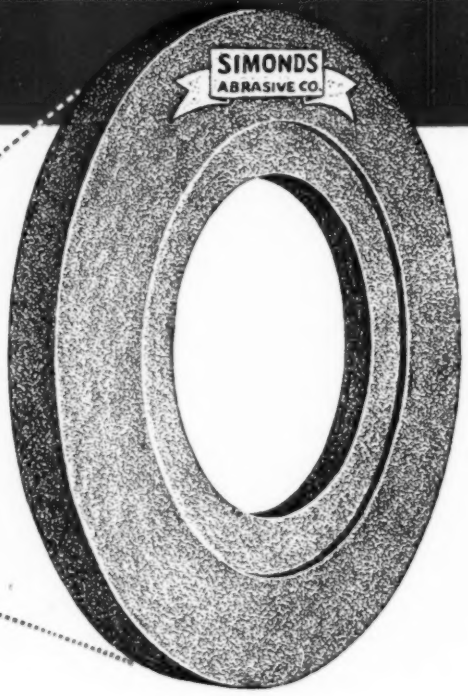
* Preferred blade sizes for future designs and development. These should not be construed as indicating that other listed sizes are special, non-procurable, or subject to special prices.

1 This form is optional on shapes A and D

SIMONDS
ABRASIVE CO.
PHILADELPHIA, PA.

Grinding Wheels



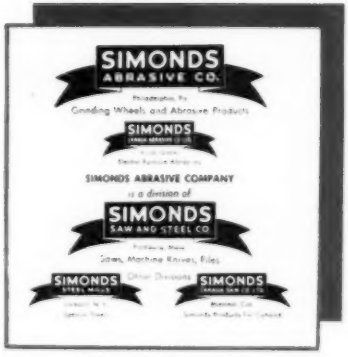


Try this on your cylindrical grinder

For high quality precision grinding . . . for fast, accurate work, minimum dressing and long wheel life.

These are features of Simonds Abrasive Company Cylindrical Grinding Wheels . . . furnished in grain and grade combinations to meet every cylindrical grinding requirement from heavy stock removal to micro-inch finishing . . . for steel, cast iron, non-ferrous metals and practically all non-metals . . . includes plain cylindrical, crankshaft, camshaft, centerless and roll grinding.

Availability: Simonds Abrasive Co. Distributors, located in all principal industrial centers of the U. S. and many foreign countries carry local stocks and are equipped to service your grinding wheel orders quickly and efficiently. Write for free Grinding Wheel Data Book which includes complete listing of grain and grade recommendations for cylindrical grinding jobs and name of distributor serving your area.



SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES

TALKING SHOP

Window Buttons

TWO VISITING ENGLISHMEN and their wives were being driven around Detroit in a Chrysler convertible equipped with hydraulic window controls. Said one guest, "I say—how do you work these windows?" Whereupon the driver reached over with his left hand and pushed all four mastercontrol buttons. All four windows disappeared like magic—and the wind whooshed the skirts of the ladies in the rear seat over their heads. At which one visitor remarked, "Marvelous what you Americans can do by pushing a button!"

When we first heard the story, it was a cowl ventilator and a French girl, and the gag line was, "Mais Dieu! Don't ze Americains use ze hands for anysing?" Be that as it may, the report is that visitors looking into a convertible from outside *will* push the window button to see what will happen. They promptly get a big surprise—and a sore jaw.

Electrostatic Painting

LATEST TRICKS in electrostatic spray painting include: 1. Magnetic holders for conveyor Christmas-tree fixtures to hold small steel parts while passing automatic guns. 2. A small percent of carbon black added to molded plastic non-magnetic or electric-insulator materials make it possible to spray-paint them electrostatically. 3. Studebaker is now painting truck cabs by this method, as is Servel, Inc., at Evansville, Ind., on refrigerators. R. C. Mahon produced spray booths and conveyors for the latter job in just eight weeks.

Studebaker is painting three different parts on the same conveyor, each on its own type of hangar: three hoods, six front fenders and eight rear fenders to a hangar. Prime coat and three color coats are applied, each about 0.00137 in. thick. Drying between coats is done by passing the parts through an octagon-section infrared oven. This avoids gases of combustion which might discolor paint (important also at Servel and Norge on refrigerator parts where white is applied). Fixtures are usually on 4-ft. centers and the conveyor travels 16 fpm. At Norge, one electrostatic spray booth replaced three water-spray booths and saves 144 manhours per day.

Food "On the House"

SCULLY-JONES & CO. of Chicago has put a new twist into the "welcome booklet" which many companies now provide to visitors. Their booklet gives spellings *and* phonetic listings (to aid pronunciations) of names of frequently visited personnel, the usual history, what the company makes and sells and *the products and services it buys.* To top it off, it offers lunch "on the house" at the company cafeteria if a delay is unavoidable. President Scully started the booklet when he saw a visitor waiting—unavoidably—for 20 minutes one day in the reception room.

Hard of . . .

FRED COLVIN tells a story that's worth passing on. As a cub editor, back in the Eighties, he visited old L. S. Starrett in Athol, Mass. Said L. S.: "I'm a little hard of hearing, so you'd better write down what you have to say. That way I'm sure to understand." Wrote Fred, who has always had a speech impediment, "Well, I'm a little hard of speaking myself." Fred reports they got on famously, then and on many subsequent visits, with *everything*—in contrast to the custom of those days—in writing.

Aphorisms

L. A. DANSE of G. M., a director of the American Society of Lubricating Engineers, offered these aphorisms in discussion of a paper on hydraulic power control at a Detroit Section meeting:

OPPORTUNITY is making the most of what you have now.

PREVENTIVE MAINTENANCE keeps wheels turning with least friction—and cuts "down time."

GET DOWN TO FUNDAMENTALS—and pull the grease monkey out of the grease.

HYDRAULIC-OIL SERVICE is at the mercy (?) of the machine-tool maintenance men.

DON'T DEPEND ON PIPE FITTERS or electricians to service machine-tool hydraulic systems—have men with special training and experience.

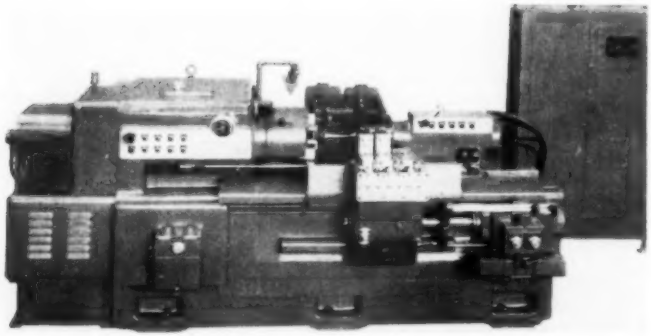
Gallium

A RARE, silvery-white metal, liquid at temperatures over 86 F., is now being produced by Alcoa. It won't boil until heated to about 3700 F., however, and shows a strong tendency to undercool—so the liquid will stand for some time at water's freezing point before it solidifies. Although somewhat like aluminum chemically, gallium has twice the density (5.9), and like water its density as a liquid is greater than as a solid. It will wet many nonmetallic surfaces, like glass or porcelain, will not form an oxide even when heated to 1000 F. There's about an ounce of it in a ton of bauxite, and Alcoa will sell you some if you have ideas for it—and the cash to buy it.

Tool Control

CARBOLOY is pushing tool control, reports that one midwestern engine plant standardized tools and cut tool and fixture inventory from $3 million to $700,000. That's a way to cut capital assets and resulting taxes . . . In another case, one small plant recovered $14,000 worth of scattered tools in the first month of a tool-control program. It's worth cleaning house for, once each quarter—finds good tools and writes off tax-costly scrap ones.

Shop Equipment News



Morey Machinery Automatic Lathe Handles Variety of Tooling Setups

Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y.

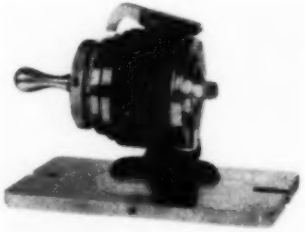
An automatic lathe for high-production turning is hydraulically operated and electrically controlled. It is built in two models: DB for work between centers and CD for chucking and fixture work. The various types of standard rear slides and front carriages available permit a large variety of tooling arrangements.

The lathe illustrated is tooled for turning a front automobile axle. Two speed ranges with automatic speed change during the work cycle make the lathe suitable for facing and turning of flanged work in one chucking with the correct cutting speed from the largest to the smallest diameter.

Pushbutton controls for all functions of the machine are provided. The hydraulic system, electrical controls, and coolant system are all included so that no auxiliary equipment is required. The lathe is designed to transmit 50 hp. continuously with temporary overloads up to 75 hp.

Model DB will take work from 6 to 36 in. long and will turn up to 6-in. dia. Swing is 15 in. over the carriage and 23 in. over the bed.

Model CD will take work from 6- to 16-in. dia. and 4 in. long. Both models can be equipped with a single-range headstock for speeds of 600 to 60 rpm. or a dual-range headstock with V-belt drive 900 to 300 rpm. and back-gear range 300 to 100 rpm. Feeds are stepless with dial control from 1 to 25 ipm. and rapid traverse of 120 ipm.



Royal Oak Co. Grinding Fixture Cuts Flat, Concave Chip Breakers

Royal Oak Tool & Machine Co., 621 E. 4th St., Royal Oak, Mich.

Chip-breaker grinding fixture provides for flat or concave grinding of chip breakers on tungsten-carbide insert-type bits. Although the fixture is designed for use with surface grinders it can also be applied to cutter grinders.

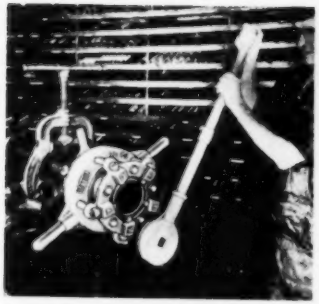
Clearance from fixture base to the face of the collet is $5\frac{1}{2}$ in. permitting vertical positioning under the wheel. Calibrated scales provide for setting at desired angles. Interchangeable index plates assure true triangular and square forms. Special collets for square, round, triangular and rectangular carbide inserts are available in $\frac{1}{4}$-, $\frac{3}{8}$-, and $\frac{1}{2}$-in. sizes.

K. H. Huppert Electric Furnace Is Controlled From 100 to 2000 F.

K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37, Ill.

Practical heat control over the range from room temperature to 2000 F. is provided in the No. 11 FM special electric furnace. Control is by two Infitrols mounted on the base of the furnace. A third control is mounted beneath the furnace.

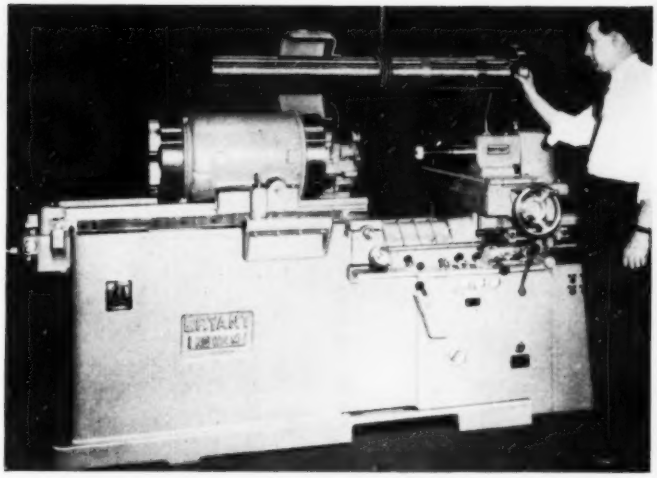
Two sets of heating elements—one top and bottom, and the other on two sides—are each controlled by one of the Infitrols. Temperature is governed automatically by the third control. Inside dimensions are 8x6x12 in.



Oster Pipe-Threading Tool Operates by Hand or Power

Oster Mfg. Co., 2057 E. 61st St., Cleveland 3, Ohio

Pipe-threading tool No. 54 is built to withstand the strain of power operation, or can be operated by hand with a ratchet handle. It is furnished with four sets of dies to thread $2\frac{1}{2}$-, 3-, $3\frac{1}{2}$- and 4-in. pipe. Each set has five individual and replacement segments.



Bryant Internal-Grinder Workhead Permits Precision on Large Parts

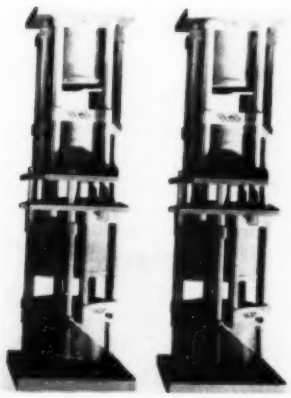
Bryant Chucking Grinder Co., Springfield, Vt.

A double-chuck workhead added to the No. 112-M internal grinder permits precision grinding of large parts. The workhead can be moved longitudinally to position the work for grinding. This machine is designed to grind special internal tapers on such parts as machine-tool spindles and axles.

A sine-bar attachment provides accurate taper control. Both inside and outside diameters as well as the face can be ground in one chucking. An attachment that is not shown allows the work to be indexed 180° to insure concentricity when both ends of the piece are to be finished.

For work of large diameter the workhead is moved to the left end of the machine and a steadyrest is used to support the end to be finished.

The workhead can be removed and replaced by a fixture so that spindles can be ground while rotating on their own bearings. The workhead base swivels to grind a maximum included angle of 30°. The wheelhead assembly is moved hydraulically to the rear of the machine to facilitate loading of long pieces. Multiple position stops can be provided for grinding step bores.



Dayton Rogers Die Cushions For Heavy Duty Develop 360 Tons

Dayton Rogers Mfg. Co., 2824 13th Ave. South, Minneapolis 7, Minn.

Die cushions of extra-heavy-duty design have an over-all ring-holding tonnage of 360 tons, developed by 100-psi. shop airline. Four of the units are mounted on a large straight-side, 2,000-ton power press. They can be operated as individual units, or piped in series.

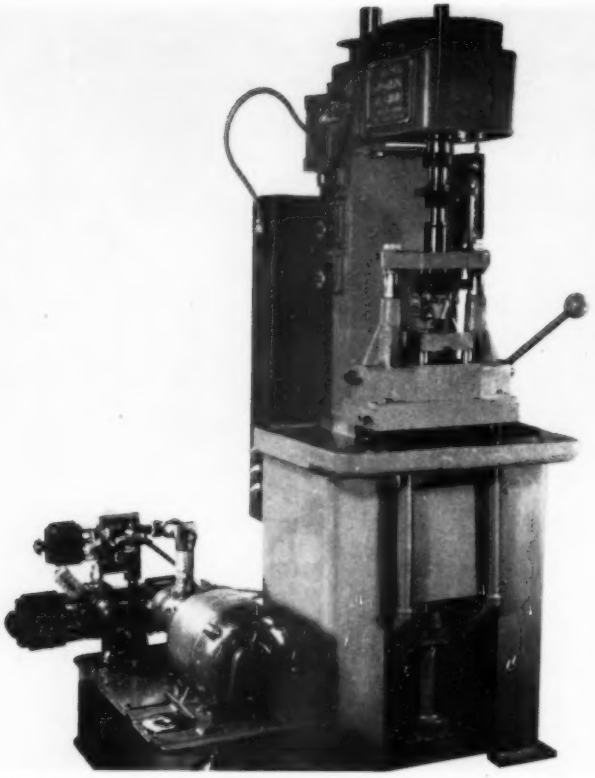
The die cushions can be used on all deep-drawing operations, and are adapted for control of die-pressure pads on forming dies, together with the use of ejector mechanism when required.

• IN APRIL 7 American Machinist

Ductile cast iron combines the process advantages of gray cast iron with the product advantages of cast steel. It is obtained by incorporating a nickel-magnesium alloy in the molten iron and results in a metal with high elastic modulus, high yield strength, and ductility.

Dual-Weld combination welder has a 10-in. throat for spotwelding, and can also be used for arc welding, soldering, and brazing. Suitable for factory maintenance and repair, research, and experimental work, it is both smaller and much less expensive than the two welders it can replace.

Power gaging of internal threaded parts is provided by a device that threads the gage into and out of the work at 4 rev. per sec. Immediate reversal or disengagement is obtained by slight changes in applied pressure.



Staple Production Honing Machine Takes Work with ½ to 4 in. ID

Staple Engineering Co., 1315 S. Woodward Ave., Birmingham, Mich.

Model B7 vertical honing machine is adaptable to work having inside diameters ranging for ½ to 4 in., and up to 6 in. long. The Staple company has for several years been manufacturing honing tools and drivers and has now developed this production machine.

The B7 is hydraulically operated and electrically controlled. Timing cycle is adjustable from 2/3 to 180 sec. Size control is manual by a graduated dial. The reciprocating worktable is 6 in. wide and 18 in. long with a travel of 8 in.

Variable-speed drive is provided to the spindle. Honing stones are fed out and contracted automatically with adjustable pressure and rate of feed.

Pratt & Whitney Piston Gage Checks Six Points, Stamps Grade

Pratt & Whitney, Div. Niles-Bement-Pond Co., Hartford, Conn.

A multiple-station piston gage checks six dimensions simultaneously, stamps two grades, and automatically shows the number of pistons of each grade inspected. The gage employs Electrolimit and multiple-electric-contact gaging mediums.

When the inspector pushes the piston into gaging position, the gage is in operation. By looking at the instrument panel, the inspector has the complete information on each piston. At the same time the piston is automatically marked with the grades of the skirt diameter and the pinhole diameter.

Errington Adjustable Drillhead Includes Two to Six Spindles

Errington Mechanical Laboratory, Inc., Staten Island 4, N. Y.

Adjustable drillhead is fully geared with needle bearings on all spindles. It can be supplied with two spindles, with three spindles for equal adjustment in line, and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles. The range is from 0 to 1½-in. drills. All parts are fully inclosed.

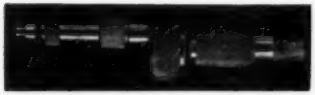
Clark Industrial Towing Tractor Protects Tires with Shorter Axle

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

A new steering axle designed to provide full protection for tires is standard on the redesigned Clarkat industrial towing tractor. Steering tread has been reduced from 27 in. to 22 5/16 in., which permits

the wheels to be turned to their extreme position within the body of the machine.

Tie rods have been raised and a heavy steel plate six inches wide is mounted beneath the axle to protect the steering mechanism. A universal joint incorporated in the steering mechanism helps eliminate wheel kickback.



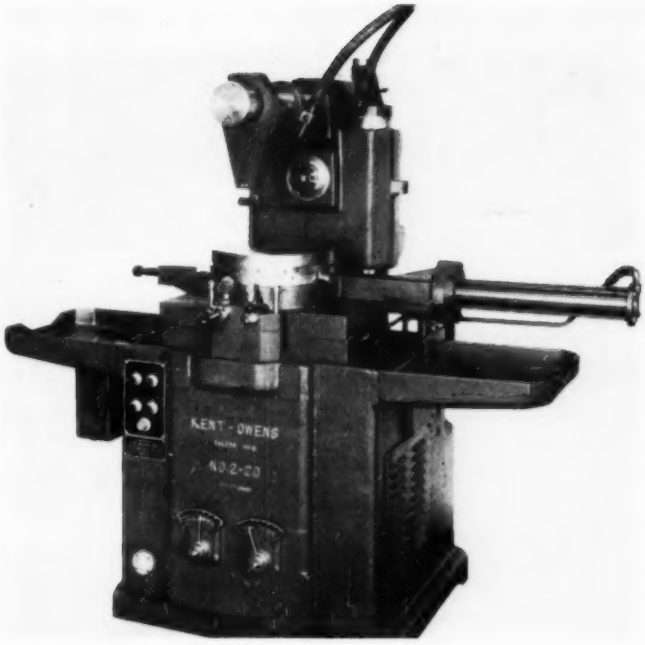
Wyzenbeek Tool Attachment Steps Up Grinder Speeds

Wyzenbeek & Staff, Inc., 838 West Hubbard St., Chicago 22, Ill.

Speed of all Wyco grinders can be stepped up three times or more with the No. 1300 step-up handpiece. With No. 1 to No. 5 shaft, by replacing the standard handpiece with the new one, speeds can be stepped up to 5000 rpm. or higher. On standard 3600 rpm., single-speed grinders, the operator can now get over 10,000 rpm. This provides a more satisfactory speed for small mounted grinding wheels. For carbide cutters, the handpiece is giving speeds up to 33,000 rpm. Any Wyco machine from 1/3 to 1½ hp can be modernized with the new handpiece.

HALF-TON LIFT TRUCK, discontinued in 1942, is now being produced again. It can be employed as a general-purpose floor truck as well as a lift truck. It provides a 2-in. lift for loads up to 1000 lb. It is built with lowered heights of 3½, 6, 7, and 9 in.

Barrett-Cravens Co., 4609 S. Western Blvd., Chicago 9, Ill.

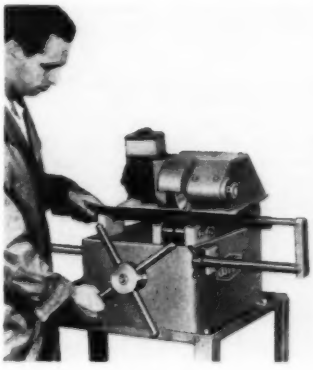


Add Hydraulic Rotary Table To Kent-Owens Milling Machine

Kent-Owens Machine Co., Toledo, Ohio.

A hydraulically controlled rotary table, replacing the standard table, has been installed on the No. 2-20 milling machine. The rotary table is 16-in. dia., driven by a gear and rack mounted at the rear of the fixture. The rack is actuated by a hydraulic cylinder. Dogs can be placed on the outside of the rotary table to give the desired cycle.

The No. 2-20 has twelve spindle speeds ranging from 64 to 860 rpm. The drive is from a standard foot-mounted motor at the rear of the machine. It goes vertically through a splined drive shaft, worm and worm gear, then through pick-off gears directly to the cutter. The head is mounted on two cylindrical ground steel posts which carry the spindle between them for rigidity without overhang.

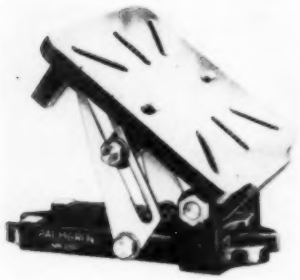


Oster Pipe-Cutting Machine Cuts ½- to 2-in. Dia. Pipe

Oster Manufacturing Co., 2057 E. 61st St., Cleveland 3, Ohio

Sixty pieces of 2-in. or 150 pieces of ½-in. pipe can be cut off in 10 min. with the No. 662 Cut Master. The machine will handle pipe from ¼- to 2-in. diameter.

The drive motor is ½ hp., 10,000 rpm. The gear ratio is 29.25 to 1. Turning the handwheel moves the cutter wheel up or down. Rollers supporting the pipe are mounted on needle bearings and ground to prevent cutter breakage. The machine weighs 225 lb.

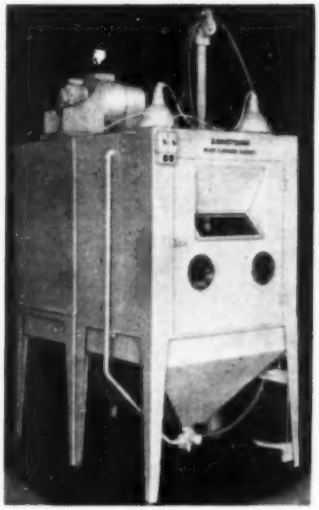


Palmgren Adjustable Angle Plates Hold Work Not Suited to Vise

Chicago Tool & Engineering Co., 8383 South Chicago Ave., Chicago 17, Ill.

Palmgren adjustable angle plates are designed for setting up jobs difficult to hold in a vise. Many jobs can be mounted on these plates that would normally require special setups.

Bases are provided with bolt lugs for fixing to the table. Bolt slots on the surface plate are provided for holding work. The plates can be adjusted through 90° and are graduated for all angles. They can be furnished with or without graduated swivel bases. Two sizes are available with surface plates 6x6 in., and 9x9 in.



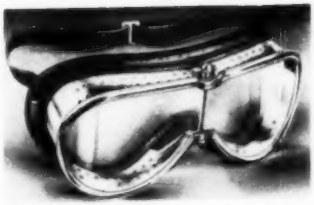
Sanstorm Self-Contained Cleaner Dusts Work After Blast Cleaning

Sanstorm Mfg. Co., Fresno, Calif.

Self-contained and suction-type blast-cleaning cabinets and associated dust arrestors, are designed to use any type of abrasive required for cleaning ferrous and non-ferrous metals, or for frosting and etching glass, ceramics, and plastics. The control valve provides, in addition to off and abrasive positions, a clean-air blast position for dusting off the finished work.

Abrasive is drawn into the abrasive-control mixer at the bottom of the cabinet hopper and is carried through the abrasive hose for forcible discharge within the cabinet. The spent abrasive falls through a steel grate flooring to the bottom hopper. After being screened through a basket-type screen, it is ready for reuse. The operator can insert his hands through arm protectors for manipulation of the blasting nozzle and work.

The cabinets are available in sizes ranging from 36 in. long by 60 in. wide to 20 in. long by 30 in. wide. A junior model, 18-in. square, for cleaning minute parts, is priced at $99.50.

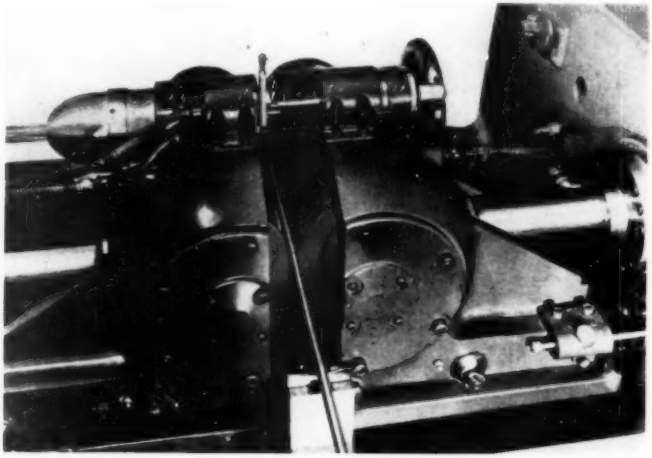


Rubber Cushions for Comfort Now on American Optical Goggles

American Optical Co., Southbridge, Mass.

Rubber cushions are now available for the Panoram goggle to provide extra wearing comfort. Made of Neoprene sponge rubber, the cushions are molded to the shape of the eye cup and can be easily slipped into place.

A pouch-type plastic case to protect the goggles when not in use is also announced. The case has reinforced edges.



Watson-Flagg Heavy-Duty Machine Rolls Continuous Threads, Knurls

Watson-Flagg Machine Co., 845 E. 25th St., Paterson 3, N. J.

A heavy-duty precision thread roller, Model C, will roll continuous threads, knurls, or serrations. The heavy frame permits 72% higher hydraulic rolling pressures than previous models. The machine will therefore, handle material of higher physical properties, greater diameter and pitch, and increased length.

Model C will take diameters from 0.138 to 4 in. with a maximum of 8 pitch. When through rolling is not used, it will handle a standard thread length of 2¼ in. and a maximum of 3¼ in.

Dies average 6½-in. dia. and provide rolling speeds of 200 to 540 fpm. The machine will handle any material that has an appreciable percentage of elongation. To change setups, workrest and dies are the only parts that need to be changed, and 30 to 45 min. will complete the average changeover. Micrometer size control is provided.

Motor-Makers Know that AMERICAN PHILLIPS SCREWS *put up a "Good Show"*

On the Production Floor... and Sales Floor, too!

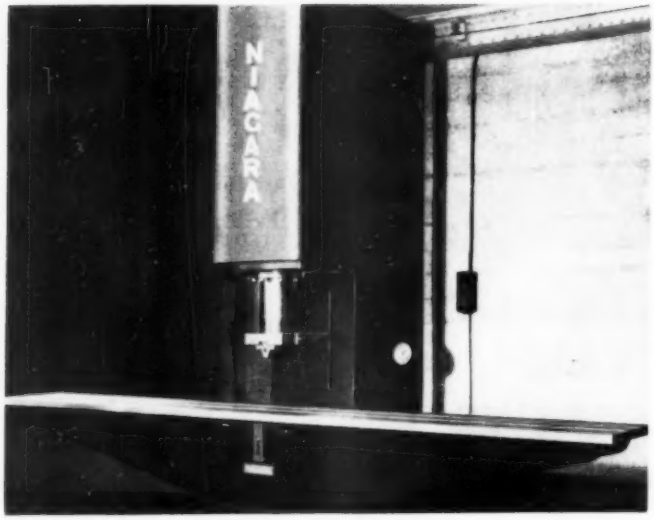
GOOD SHOW IN PRODUCTION: Assembly rolls along smoothly in high gear, with fastenings made by American Phillips Screws that turn up straight and tight *every time* . . . with never a slip or a slash to spoil costly enameled surfaces. Workers do more and better work, far more easily, than they ever did with out-of-date slotted screws. *And time savings run as high as 50%.* That's why so many million American Phillips Screws are used in automotive plants *every month.*

GOOD SHOW IN SALES: The modern mark of American Phillips' cornerless, crossed recess is one of the quality insignia of top cars and trucks . . . a feature looked for and recognized by customers. It means no unsightly burred heads to mar sales appeal or snag clothes and hands. And it means extra vibration-resistance to keep bodies tight and squeak-free. Does *your* product have this double-feature of production-economy and sales promotion? Then write:

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND
Chicago 11: 389 E. Illinois St. *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

ALL TYPES
ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)



Niagara Machine's Hydraulic Press Controls Ram with Single Lever

Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y.

Straightening, forming, broaching, forging and assembling operations can be handled by a 135-ton hydraulic press with 33-in. ram travel and a bed 30x240 in.

Hydro-Touch control governs approach speed, applied pressure of the ram, and return speed all with one lever. Speed of ram approach is proportional to the initial movement of the lever. When the punch touches the work initially, it exerts practically no pressure. Further movement of the control lever applies pressure in proportion to the amount of lever movement. Releasing the lever at any point stops the ram, and raising the lever to extreme upward position lifts the ram to top position.

O'Neil-Irwin Radius Brake Bends Low-Ductility Materials

O'Neil-Irwin Manufacturing Co., 311 8th Ave., Lake City, Minn.

A radius-forming brake with 24-inch capacity, No. 4, was primarily designed for the forming of duralumin, chrome molybdenum, and other materials of low ductility which fracture if formed to a sharp bend. Standard forming bars permit bends with radii of 0, 1/16, 3/32, 1/8, 5/32, 3/16 and 7/32 in. This Di-Aero brake supplements the 12-in. model already available.

Buhl Pocket Microscope Adjusts to 40, 50, 60 Power

Buhl Optical Co., Pittsburgh 12, Pa.

Pocket microscope for shop, laboratory, and office adjusts to 40, 50 and 60 power. When collapsed it is about the length of a fountain pen with 3/4-in. diameter. It has a hooded reflector and knurled collar for fine focusing at the object end. With a satin-chrome finish and 20 mm. focal length, the price is $18.50, including a leather carrying case.

Plastic-Coated Safety Glove Is Impervious to Most Oils

Belle City Glove Co., 112 E. Chestnut Street, Chicago 11, Ill.

A plastic-coated and impregnated safety glove, with a cotton-fabric base, is claimed to give up to 10 times the wear normally expected of neoprene-coated gloves. Plastigluv provides protection against chemicals, abrasion burns, flame, heat and liquids. It has high dielectric strength and is impervious to most oils. The plastic gives a non-slip gripping surface.

Yale & Towne Lift-King Trucks Combine Low Mast with High Lift

Yale & Towne Manufacturing Co., 4530 Tacony St., Philadelphia 24, Pa.

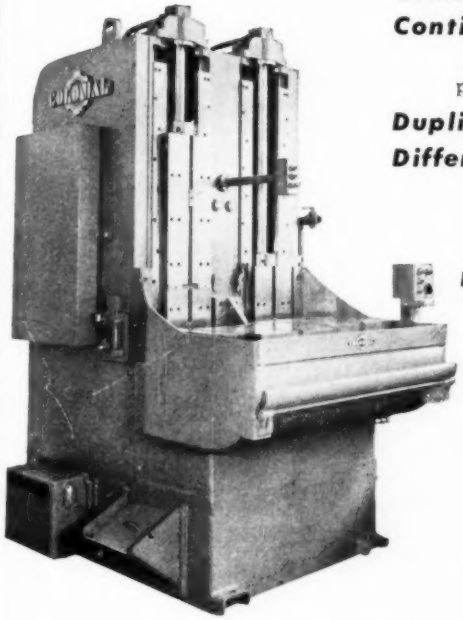
The Lift-King line of electric trucks provides low mast heights with high free lifts. One series has a free lift of 66 in. before the telescopic mechanism begins to extend, a total lift of 130 in., and a collapsed height of 83 in. It will carry up to 6,000 lb. A second series has an over-all collapsed height of 68 in., free lift of 51 in., and total lift of 100 in.

The new truck line provides for sit-down operation with automotive-type controls. Lift mechanism is hydraulic with stationary hose connections so that hose need not dangle from elevated members when making high lifts.

Get those Machining costs down-

WITH MACHINES LIKE THESE

New COLONIAL DUAL-RAM Surface Broaching Machines



Continuous loading
Continuous cutting
with the rams
performing either
Duplicate operations, or
Different operations, on
the same or
different parts

Now further improved with

All electric controls

•

Preselective continuous or single cycling

•

Faster set-up

•

Minimum down-time for maintenance

•

Higher capacity

•

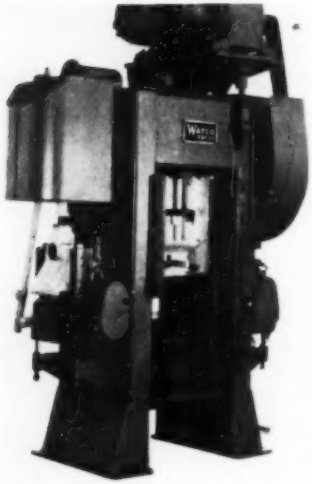
and a host of other operating and structural features.

Ask for Bulletin #RT-48

PIONEERS OF H.S.S. BROACHING

COLONIAL

BROACH CO. DETROIT 13



Warco 75-ton Stamping Press Includes Air Counterbalancing

Warco Press Div., Federal Machine and Welder Co., Warren, Ohio.

High-speed stamping is possible with a new 75-ton press. Welded and stress-relieved steel construction with hand-fitted square gibbing to assure accurate alignment are used in building the press. The full eccentric shaft has long support bearings. Air counterbalancing is provided to reduce the shock of break-through.

Other features include an automatic lubrication system, variable-speed drive, accessible location of adjustments, and provision for the installation of die cushions.

Infinite variation is possible in feed lengths.

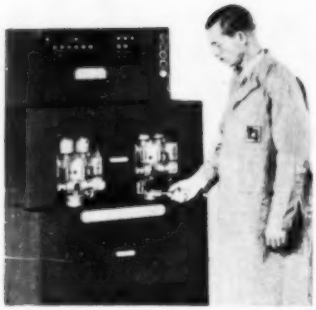
All of the new models have jaws 6x1½ in. Clearance of jaw top to bar varies from 4⅛ to 6¾ in., and maximum opening 10½ to 11 in.

Boston Gear Works Coupling Has Synthetic Rubber Insert

Boston Gear Works, Quincy 71, Mass.

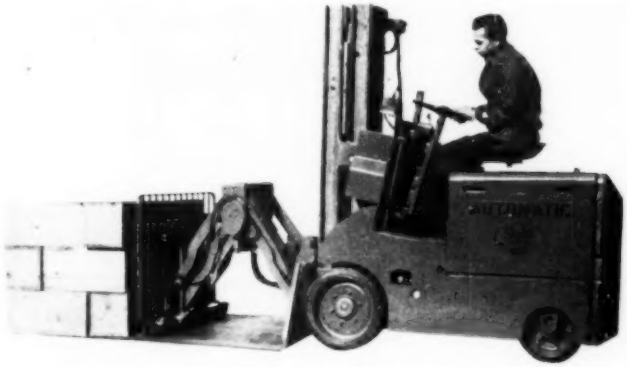
A flexible coupling with a synthetic rubber insert has simple, three-piece construction. It is available for shafts ⅜ to 1½ in. in diameter and is provided with standard keyways and setscrews.

The coupling requires no lubrication, but the synthetic rubber insert is not harmed by oil or dirt.



AUTOMATIC CLASSIFYING of refrigerating-unit muffle boxes into 21 divisions is performed by this Airlectric machine. It checks average diameter of the counterbore and classifies it in one of three tolerances of 0.0003 in. Depth of the counterbore is checked and classified in one of seven divisions. Final classification is automatically stamped

Sheffield Corp., Dayton 1, Ohio



Vi-Speed Air-Powered Vises Are Made in Three New Sizes

Van Products Co., 1521 Erie Trust Bldg., Erie, Pa.

Vi-Speed vises which are air powered and foot controlled are now available in three new sizes. They operate on 15 to 150 psi. air-line pressure.

Model 1000 has a jaw pressure 50 times the air-line pressure. Models 1000-D and 610-D have a pressure 100 times the airline pressure.

Automatic Transportation's Method Eliminates Pallets in Transit

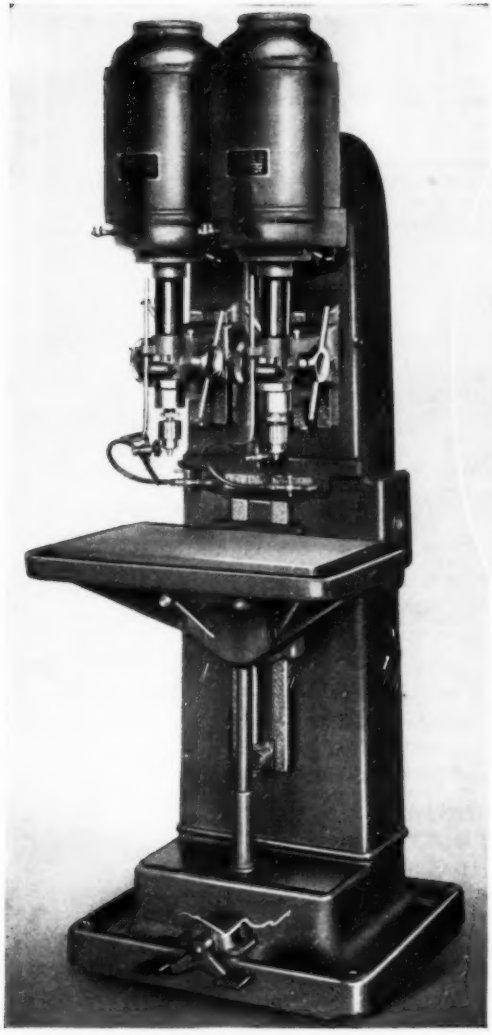
Automatic Transportation Co., 149 W. 87th St., Chicago, Ill.

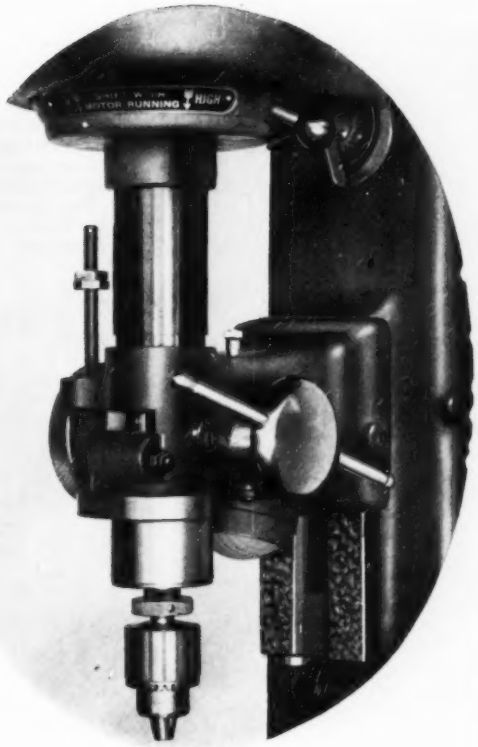
A new pallet and a push-pull attachment for Skylift electric fork trucks permits mechanized shipment without the use of pallets in transit.

The pallet is of corrugated metal with two sets of openings to permit the truck to lift load and pallet together, or to remove the load from the pallet.

A load is palletized on a sheet of heavy paper. Paper and load can be drawn onto the truck and placed on the pallet. Loads can be carried, stacked, and detiered as usual.

For shipment the load can be lifted off the pallet together with the paper sheet. The attachment pushes it into position. At the receiving point the load is pulled onto the truck and then placed on one of the corrugated pallets.



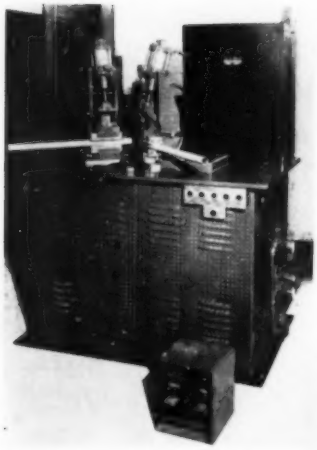


The SPINDLE in LELAND GIFFORD No. 1 LMS DRILLING MACHINE

has PRELOADED BALL BEARING MOUNTINGS TO TAKE RADIAL THRUST LOADS . . . . . has Mist Lubrication, Six Hobbed Splines for driving, Hardened Spindle Nose to prevent damage from removing chuck, Telescopic spindle Guard to protect the operator from the multiple splines of this *Rugged* and *Extremely High Speed Spindle.*

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.



Pushbutton Flash-Butt Welder Offers Swivel-Mounted Heads

Rex Welder and Engineering Co., Kansas City, Mo.

Pushbutton flash-butt welder is designed for pipe and tubing. Welding heads are swivel mounted so that two pieces can be butt-welded or flash butt-welded at an angle. The ends are cut square for both types of welding. Action is automatic and is controlled by Micro switches. Each clamping jaw has its own foot valve and air cylinder with pressure regulator. The upset action has its own supply and controls. For test purposes, the movements can be initiated separately.

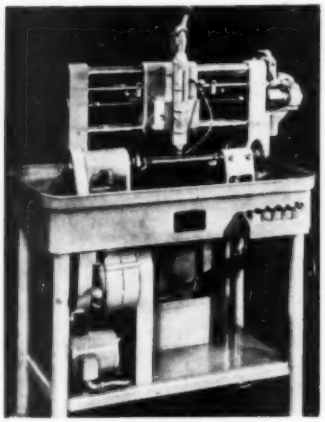
Linde Heliarc Welding Torch Will Spotweld 0.064-in. Sheet

Linde Air Products Co., Unit of Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y.

Spot welds can be made from only one side of the work with a portable, inert-gas-shielded spot-welding torch.

The Heliarc HW-8 will spotweld mild steel, low alloy, and stainless steel from 0.030 to 0.064 in. thick with currents from 155 to 250 amperes. Two sheets of these metals can be joined in one to two seconds per spot, and in addition a sheet of metal can be joined to underlying material of any thickness. For example, corrosion-resistant sheets can be welded to mild steel to provide stainless cladding.

Only one hose assembly connects the torch to the accessory equipment. The standard hose is 25 ft. long and about an inch in diameter. It contains conductors for power cable, cooling water, shielding gas, and trigger control. Electrode adjustment is made by pushbutton release located on the torch.



Gisholt Superfinishing Machine Takes Medium and Small Parts

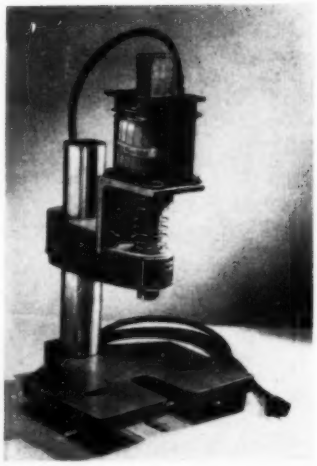
Gisholt Machine Co., Madison 10, Wis.

A general-purpose machine designed to handle medium to small cylindrical parts, Model 50, has been added to the line of Superfinishing machines. It has a capacity of 12 in. between centers, 8½-in. swing, 3-in. maximum working diameter. Work can weigh as much as 100 lb.

Variable spindle speeds from 40 to 1000 rpm. allow the operator to select the proper speed for the degree of surface finish required. The quill is spring loaded and is adjustable from 0 to 45 lb. pressure.

Two standard attachments are available now. The motor-driven traverse attachment is installed on the machine illustrated. A centerless roll-drive attachment is available for parts that have no centers.

Model 50 Superfinisher is equipped with an adjustable tailstock and a complete lubricant system. It is suited for small parts such as plug gages, hydraulic cylinders, pistons, and shafts.

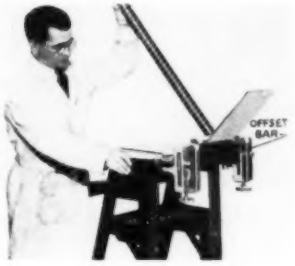


Black & Webster Electropunch Delivers 150 Blows a Minute

Black & Webster, Inc., 30 Pleasant St., Needham 92, Mass.

A high-speed Electropunch, Model BS 1, incorporates a high-temperature silicone-insulated coil in a solenoid which permits it to operate continuously at more than 150 cycles or blows per min.

Weighing 45 lb., it is suitable for staking, riveting, marking, wire cutting, blanking, forming and drawing.



W. R. Scott Cold Bar Bender Handles Sections to ½ x 6 in.

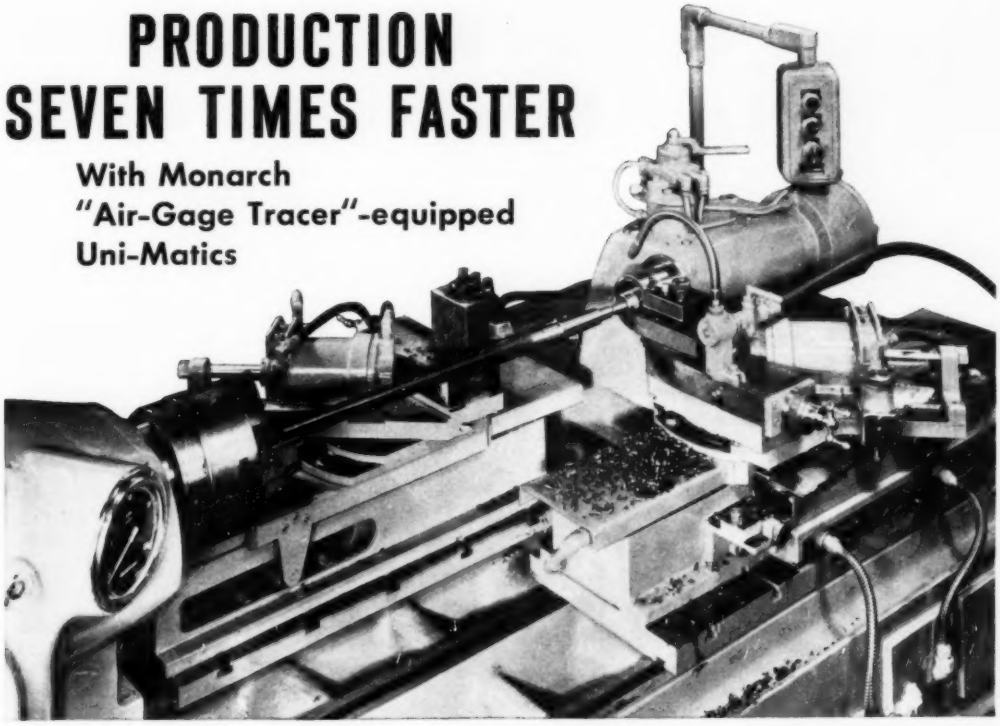
Winfield R. Scott, manufacturer; Graybar Electric Co., 420 Lexington Ave., New York 17, N. Y., distributor

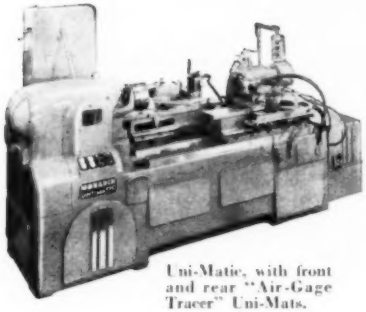
Cold bends can be made in copper, aluminum, brass, and mild steel with the form-bar bender. It will handle bar in strips from ⅛ x 1 in. to ½ x 6 in. in cross section.

The portable bender will make short offsets, twists, and Z-bends and will bend up, down, and sideways. Machines to bend larger sizes can be built to specifications.

PRODUCTION SEVEN TIMES FASTER

With Monarch "Air-Gage Tracer"-equipped Uni-Matics





Uni-Matic, with front and rear "Air-Gage Tracer" Uni-Mats.

One operator, tending two Monarch Uni-Matics, "Air-Gage Tracer"-equipped, turns out these axles in a floor-to-floor time of $1\frac{1}{4}$ minutes. In the installation obsoleted by the Uni-Matics, the same operator had to tend *four* multiple tool automatics—and the floor-to-floor time was $4\frac{1}{2}$ minutes per shaft. That's a per-machine production rate 7.2 times faster for the Uni-Matics!

But speed—and lower machine investment—are not the only advantages of this installation. Accuracy is greater, too. Run-out is held to half as much on the Uni-Matics—and by leaving less grind stock, grinding time is reduced. The simple, single-point tooling of Air-Gage Tracing means shorter setup time, fewer adjustments, lower tooling costs.

This exclusive Monarch machining method, tracing directly from a template, is equally applicable to all types of contour turning, boring and facing, including step shafts—in large lots or small. May we show you how it can bring "peak production at a profit" to your shop?

Front Uni-Mat Template, first machine.

Rear Uni-Mat Template, first machine.

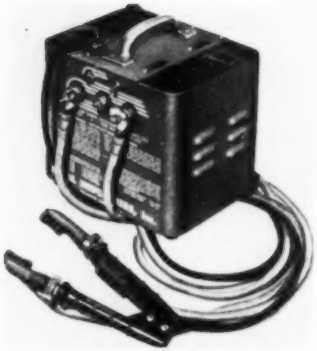
Uni-Mat Template, second machine.

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL COMPANY · Sidney, Ohio

FOR A GOOD TURN *FASTER*—TURN TO MONARCH



Resistance-Heat Soldering Tool Heats Part Almost Instantly

Ideal Industries, Inc., Syracuse, Ill.

A 450-watt, light-duty Thermo-Grip soldering tool operates on the resistance-heating principle.

Touching the work with the soldering tool completes the secondary power circuit and heats the part almost instantly. A thumb switch permits close heat control. Current is on only when the tool is in contact with the part to be soldered.

A complete set of soldering tools or attachments for handling various types of work is available.

Johnson Automatic Screw Machine Is Set Up by Adjusting Segments

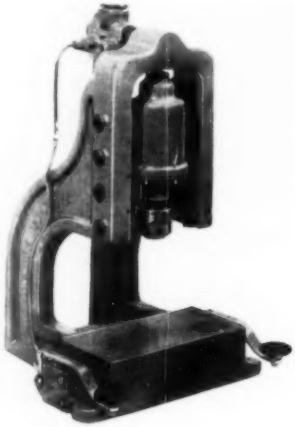
Johnson Automatic Machine Co., Westfield, Mass.

Rapid changeover is accomplished by segment adjustment in a new automatic screw machine. No cams are involved. Travel of the forming arm, cutoff arm, and stroke of drill spindles are regulated by segment adjustment. Position of studs in segments, or cross-slides and drill arm, determines the throw, movement, or length of travel of the tools.

Cycle of operation varies from 1.5 to 60 sec. and is adjusted by changing cycle gears. Feed fingers are not used. Stock is fed by a ratio motor which winds in the rope or cable attached to the stock-feed pushrod.

Finished parts and chips fall into a tote pan located in the base of the machine. It can be removed through the end of the machine and then replaced all without halting operation.

Round stock up to 1 3/16 in. can be fed through the spindle. When equipped with 1140 rpm. motor, spindle speeds of 855 to 1500 rpm. can be obtained; with a 1750 rpm. motor, speeds are 1300 to 2300 rpm. The motor is 2 hp.



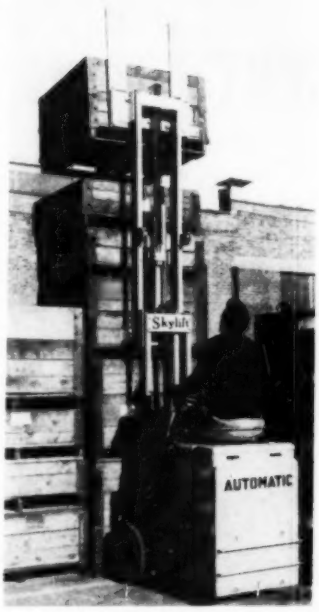
Guided Cylinder Serves as Ram In Clayton Pneumatic Presses

Clayton Manufacturing Co., 207 Delaware Ave., Buffalo 2, N. Y.

In Akrite Air Presses the piston is held fixed, and the cylinder serves as the ram. The cylinder is guided between ways. This design is claimed to give better operation of dies and to practically eliminate die shoes and guide pins.

The press is suitable for assembly, staking, swedging, and forming, and for some light stamping. Three models deliver 400, 1200 and 2000 lb. pressure operating from a 100 psi. air line.

The press has a built-in air cushion, so that squeeze action can be secured when needed. Two hand air valves are connected so that both must be pressed for the press to operate.



Automatic Transportation Model FF Is Light, Maneuverable Sky Lift

Automatic Transportation Co., 149 W. 87th St., Chicago, Ill.

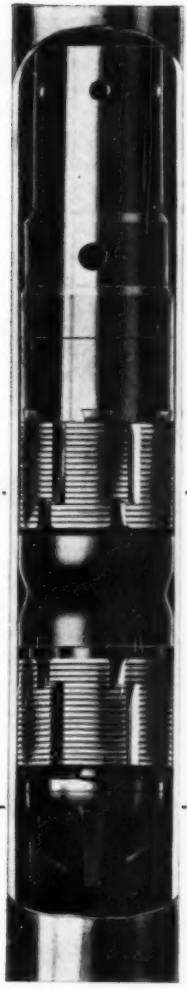
A "featherweight" fork truck in the Skylift series, Model FF, is made in 1000- and 1500-pound capacity models, with weights ranging from 2360 to 2836 lb.

Both models have a collapsed height of 78 in. and lift to 134 in. Batteries, motors, and charging equipment are interchangeable with transporters. With a 30-in. load, the featherweight models can stack at right angles from an 8-ft. aisle. A 48-in. load requires a 10-ft. aisle. The 1000-lb. model can be operated in 48-in. intersecting aisles.

Hanson-Van Winkle-Munning Engineers Dipping Baskets

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Engineered dipping baskets to suit unusual designs or standard baskets to fit a given production pattern are available no matter how unusual the specification may be. To design baskets, the Engineering Department needs to know about the work—its weight, size, shape, and anticipated hourly production—and the plating cycle to be followed.



Drillable Bridging Plug made by the Lane-Wells Company, Los Angeles, California, whose successful setting depends on the shear strength of two small pins of Revere Herculoy. These plugs vary from 38" to 58" in length.

These are the two small pins, made of Revere Herculoy to standard shear strengths, thus assuring proper setting of the Tripset plug. Pins are shown actual size.

Dependability protected through standardized-strength Herculoy

● Here is a case in which the successful operation of a large and somewhat complicated device depends upon one of its smallest and least expensive parts. The parts are two pins of Revere Herculoy. The device is a plug employed to seal off an oil well at any desired depth, to prevent taking oil or water from lower strata.

Proper setting of this plug within the well depends on those two small pins. They must shear at exactly the right load, imposed by a special setting tool. If the pins should shear too easily, the plug might not be securely set in the well and might fall to the bottom; if the pins were too tough, the plug might not set at all. From the material standpoint, successful operation of a device costing as much as $310.00 depends on the uniform shear strength of a few cents' worth of rod.

It was to assure that uniformity that the Revere Technical Advisory Service was called into action. Studies were made of the needs, tolerances specified, and means devised to assure meeting them. The specifications when finally drawn up were rather unusual, and their fulfillment is another demonstration of Revere's ability to turn out special orders when absolutely necessary. Incidentally, Lane-Wells Company, maker of the Drillable Bridging Plug, also uses Revere phosphor bronze, strip brass, Herculoy rod and free-cutting brass rod for other parts.

Before you place your next order for copper and copper alloys, get in touch with the nearest Revere office. And remember, if you are having any difficulties in the employment of copper and brass mill products, the Revere Technical Advisory Service will gladly collaborate with you.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, New York

• • •

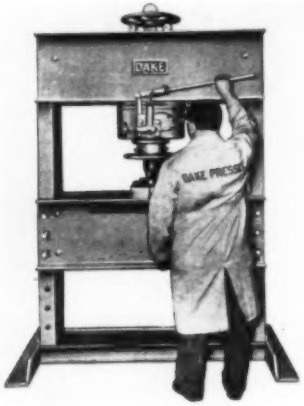
Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y. Sales Offices in Principal Cities, Distributors Everywhere.

Cunningham Reverse Stamps Cut Deep Letters in Molds

M. E. Cunningham Co., 95 E. Carson St., Pittsburgh, Pa.

Reverse safety stamps for reproducing raised letters and figures on plastic, glass, or rubber products are made with 30° bevel characters. These S-T-M stamps are designed to produce deep, clear-cut stamping in metal molds.

Character sizes range from 1/32 in. through ½ in. and all stamps 1/16 in. and larger are available in condensed, medium, and extended widths. These letters and figures are also furnished in steel type with reverse style characters for multiple stamping and in regular style characters for conventional use.

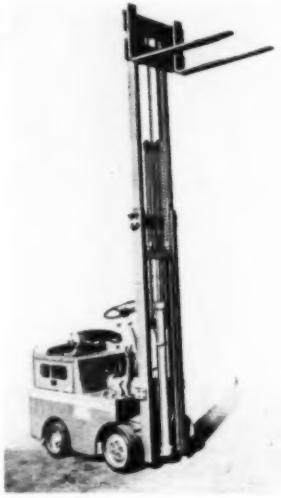


Dake 125-ton Hydraulic Press Has Hand, Air, Electric Models

Dake Engine Co., Grand Haven, Mich.

A 125-ton hydraulic press is available for hand, air, or electric operation. It has an 8-inch stroke with an additional 8-inch adjustment by an auxiliary screw-type ram. Special frame sizes are available.

Air models operate from either 90 or 145 psi. A by-pass relief valve prevents over-extending the ram. Safety valves on air and electric models guard against over-loading. Widths between uprights is 48 in. and distance between table channels is 12¼ in.



Clark Equipment Co. Hi-Lo-Stack Now Available for Clipper Trucks

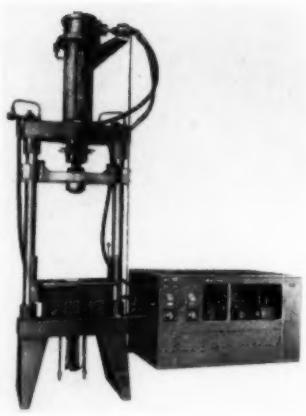
Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

The Hi-Lo-Stack device introduced on Clark Carloader fork-lift trucks is now available in a special design for the Clipper models. It has a collapsed height of 83 in., a maximum lift of 130 in., and a free lift of 64 in. without increasing overall height of the truck. Improvements in the Hi-Lo-Stack include a single hydraulic lift cylinder and a single set of uprights.

Hufford Rotating Tool Press Forms Plastic Materials

Hufford Machine Works, Inc., Redondo Beach, Calif.

A rotating tool hydraulic press is applicable to general pressing and forming operations of plastic materials, where a combination of controlled tool rotation and pre-regulating pressing tonnage is desired.



The press provides two basic operations: (1) the rotating tool presses and at the same time descends and ascends to form an accurate thread, and (2) work is forced against a fixed, rotating tool. The unit can be operated as a manually controlled, single-cycle unit or as a continuously cycling unit, delivering desired motion pattern.

TWO-COLUMN VERTICAL PRESS for broaching, swaging, and straightening agricultural implements and tractor parts has maximum tonnage varied from 5 to 25 tons through a micro-adjustable relief valve. Broach receiver basket is lever operated and spring returned. Press has a 24-inch stroke *Oilgear Co., 1330 W. Bruce St., Milwaukee 4, Wis.*

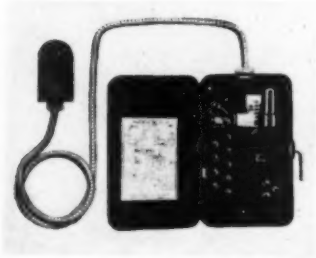
How to Build Links at Less Cost with Arc Welding

The links and clevises shown above are typical of the many different kinds of machinery component parts that are being fabricated today at less cost with arc welding than with other methods. Welded steel parts like these are decidedly stronger and more rigid, yet require considerably less material to build. Amazingly simple in design, welded steel machinery parts can be produced efficiently in all quantities using steel plate and standard mill shapes and forms.

More detailed data on the design of links and other machinery parts for arc welding is contained in the "Procedure Handbook of Arc Welding Design and Practice." Price $1.50 postpaid in the U.S.A., elsewhere $2.00.

The above is published by **THE LINCOLN ELECTRIC COMPANY** *in the interests of progress.*
Machine Design Studies are available to engineers and designers. Write on your letterhead to The Lincoln Electric Company, Dept. 103, Cleveland 1, Ohio.

Parts and Materials

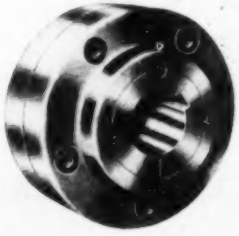


Photoswitch Photoelectric Control Designed to Work in Limited Space

Photoswitch, Inc., 77 Broadway, Cambridge, 42, Mass.

A photoelectric control, Type 20DJI for applications where the space is limited has the phototube either integral with the housing or in a small separate housing as illustrated. A tamper-proof sensitivity adjustment on the control permits positive operation over varying distances between phototube and light source, and under all conditions of ambient light.

The control is said to be particularly efficient in counting, conveyor-control, short-range signal systems, motor or valve control, production inspection, and machinery safeguards. With a 10-ft operating range, the relay operates in 1/20 of a sec.

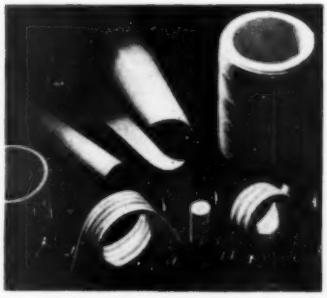


Dodge Taper-Lock Couplings Replace Small Flange Couplings

Dodge Manufacturing Co., Mishawaka, Ind.

Taper-Lock rigid couplings for connecting the ends of two shafts permit easy coupling or disengagement and provide the equivalent of a shrink fit by tightening two setscrews.

The new couplings will be furnished in sizes up through 5 in. They replace ribbed and compression couplings and flange couplings in the smaller sizes. Flange couplings will be continued in sizes from 3 7/16 to 12 in.



Stalwart X-7 Silicone Rubber Has Improved Physical Properties

Stalwart Rubber Co., 218 Northfield Road, Bedford, Ohio.

X-7 silicone rubber is said to have better than twice the resistance to permanent compression and somewhat greater tensile strength than former types of silicone rubber. It is suitable for dielectric applications and is practically unaffected by temperatures from —160 to 500 F. It will resist the chemical action of lubricating oils.

Dayton Rogers Layout Fluid Now Removes Grit from Surface

Dayton Rogers Manufacturing Co., 2824 13th Ave. S., Minneapolis, Minn.

A solvent added to layout fluid is an acid-cutting material which automatically removes all grit and dirt from the surface being laid out. After being exposed to the air a short time it is neutralized by the alcohol in the fluid itself to avoid damage to the surface.

New packaging for the layout fluid is provided in 4-oz. brush-in-can, pint, quart, gallon, and 5-gallon containers.

Reardon Gun-Type Applicator Blows Grafize Powder Lubricant

Reardon Products, 2105 South Adams St., Peoria 2, Ill.

A gun-type applicator blows Grafize powder lubricant into working mechanisms. To refill, the nozzle is removed, bulb compressed, and the end inserted into a can of the powder lubricant. Grafize is not an oil and has no oil derivatives. It will withstand heat to 6300 F.

GE ½-hp. Thy-mo-trol Drive Provides Stepless Speed Control

General Electric Co., Control Division, Schenectady 5, N. Y.

A low-cost Thy-mo-trol drive, type HI, utilizes a simplified half-wave circuit to provide dc. flexibility from ac. power. It is furnished in ratings through ½ hp.

The drive operates from 220-volt, 60-cycle alternating current. For other voltages a suitable anode transformer can be provided. It provides stepless speed control from 1725 to 86 rpm., in ambient temperatures from 50 to 104 F.

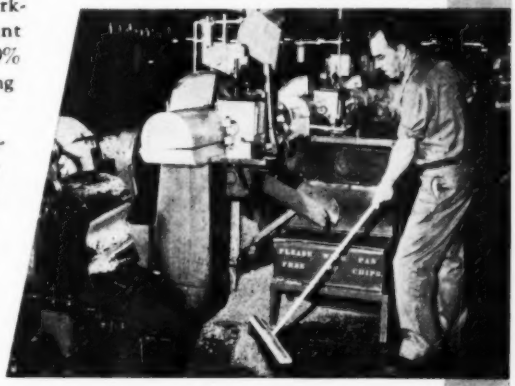
The drive is designed for constant-torque loads. Speed may be preset or may be varied during operation and under load.

Osborn Brushes = FORMULA FOR KEEPING 16 ACRES* NEAT-AS-A-PIN!

Maintenance Crew of Cleveland Graphite Bronze Co. keeps *700,000 sq. ft. of plant area "Ship Shape" with longer lasting Osborn paint and floor sweeping brushes

THE Cleveland Graphite Bronze Co., Cleveland, Ohio, believes that plant cleanliness contributes to precise, efficient operation. And keeping "the world's largest producer of line bearings and bushings" neat and tidy provides a full-time job for 109 maintenance men.

To that end Osborn Brushes—longer lasting cleaning tools that cut maintenance costs—play a significant part. With 700,000 sq. ft. of floor space or *more than 16 acres* of cleaning area requiring daily attention, these lightweight "work-balanced" Osborn Brushes reduce fatigue, speed plant cleaning, save man hours. For maintenance costs are 99% labor and poor cleaning tools add to overhead by slowing down efficiency of cleaning personnel.



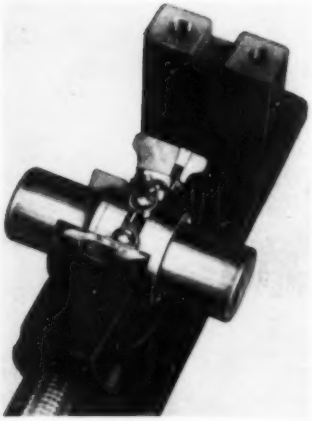
With today's high break-even point in plant operation, industrial America is alerted to the need for more effective time and labor saving tools. *And Osborn Power Driven Brushes, Paint Brushes and Maintenance Brushes* are serving cost-conscious companies by lowering production and maintenance costs.

For more "Brush Facts", get in touch with your local Osborn Industrial Supply distributor or write to...

THE OSBORN MANUFACTURING COMPANY
Dept. 112, 5401 Hamilton Avenue *Cleveland 14, Ohio*

Osborn Brushes

WORLD'S LARGEST MANUFACTURER OF BRUSHES FOR INDUSTRY • POWER DRIVEN BRUSHES • PAINT BRUSHES • MAINTENANCE BRUSHES



Fafnir Bearing Take-Up Units Have Shaft Sizes 3/4 to 2-7/16 in.

The Fafnir Bearing Company, New Britain, Conn.

Especially adaptable for conveyor construction, shaft adjustment and belt-tightening devices, a new series of take-up units is designated Type LTU. In shaft sizes from 3/4 to 2-7/16 in., the units incorporate free-lubricated, self-aligning ball bearings with wide inner ring, self-locking collars, and frictionless Mechani-Seals.

An inner-steel plate shield attached to the outer ring of the bearing, retains the lubricant, while a rotary slinger attached to the inner ring of the bearing throws off contaminants.

Texas Co. Heavy Industrial Grease Made in Soft, Winter Consistency

The Texas Co., 135 E. 42nd St., New York, N. Y.

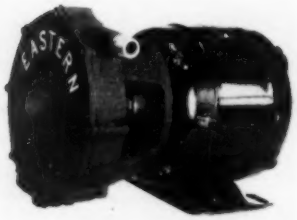
A soft consistency grease for winter use in heavy-duty industrial service is known as H Grease O. It has a lime soap base, is gold in color and is suitable for low-temperature applications. The new material completes the H Grease series which also includes Nos. 1 and 2.

Two Soluble Tripoli Compositions By Hanson-Van Winkle-Munning

Hanson-Van Winkle-Munning Co., Matawan, N. J.

Two Tripoli compositions which are said to combine solubility with really good working properties are 2-S-10 and 2-S-12. Although the performance characteristics of these compositions are good, the cutting properties, composition, and buff "mileage" do not equal the standard Tripoli compositions.

They are useful where the composition tends to pack and cause a cleaning problem. Composition 2-S-10 is for heavy-duty jobs where more cut is required, and the maximum solubility is not the primary requirement. Composition 2-S-12 provides less cut, but is more soluble.



Eastern Model H Centrifugal Pump Gives Moderate Pressure and Flow

Eastern Industries, Inc., 296 Elm Street, New Haven 6, Conn.

Model H centrifugal pump is designed for applications where moderate pressures and volumes are required from a pump running at 1725 rpm. Performance curve of the pump shows a shut-off pressure of 19 psi., 10 gpm., at 15 psi., 15 gpm., at 10 psi., and in excess of 20 gpm. at free flow.

The pump is constructed in either bronze or aluminum and is available with motors ranging from 1/6 to 1 3 hp.

Sun Lubeway Is Dual-Purpose Oil For Ways and Hydraulic Systems

Sun Oil Co., 1608 Walnut St., Philadelphia 3, Pa.

A dual-purpose oil, Lubeway is designed for machine tools that pressure-feed way lubricant from the hydraulic system.

Tests for more than a year in machine-tool builders laboratories, and under production conditions in industry, are said to show that Lubeway has the stability and non-sludging characteristics of a good hydraulicoil, and the metal-wetting and extreme-pressure qualities of a good way lubricant.

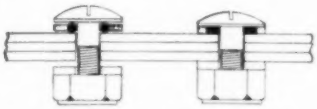
Reports are said to show that the new oil does not form gummy deposits in pumps, lines, valves, or controls. The oil is available in two viscosities, Lubeway 150 and Lubeway 300.

Strong Industrial Scotch Tape; 1-in. Width Will Hold 180 lb.

Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul 6, Minn.

A paper tape with a tensile strength of 180 lb. per inch of width, No. 230 Scotch tape, has thread-like fibers to reinforce the paper backing. It has a pressure-sensitive adhesive.

The tape can be used for packaging metal pipe, conduits, rods, rolls, sheets, coils, fittings and tubing by wrapping it once around the load and back on itself. The tape is more than twice as strong as its strongest predecessor in the Scotch line.



Sealing Washers Remain Active Because Compression Is Limited

Franklin C. Wolfe Co., 407 Commercial Center St., Beverly Hills, Calif.

Sealing washers for use around screws, bolts, rivets, tubing, wiring, consist of a small doughnut-shaped ring of sealing material inside a washer-like retainer. Upon compression, the rubber sealing material is prevented from being compressed beyond its elastic limit by the metal retainer. The seals are said not to deteriorate, and to be reusable. The Lock-O-Seal washers provide a locking as well as a sealing action.

Mansco Coated Abrasive Will Grind Hard Alloys

Mansco Grinding Wheel Co., 2164 E. 36th St., Cleveland 15, Ohio

The Buxite process is a method of coating each grain of a grinding wheel with a microscopically thin shell of carbon in an isotropic vitrescent form. The wheels are claimed to be effective for grinding carbide tools and other super-hard alloys.

Fast cutting is accomplished with light passes that generate little heat. The need for diamond-wheel grinding is claimed to be reduced and frequently eliminated.

3 UNSEEN VALUES

in every Shield Brand Tool

QUALITY THAT REDUCES YOUR COSTS!

Because of unexcelled design, material and workmanship.

PERFORMANCE THAT SPEEDS YOUR PRODUCTION!

Proved because Shield Brand Tools are specified and used in every mass production industry.

SERVICE THAT SAVES YOUR TIME!

Over 10,000 items carried in stock; warehouses in principal cities; a complete line of tools stocked coast to coast for prompt delivery to you by leading Mill Supply Distributors.

ASK YOUR DISTRIBUTOR TO SUPPLY YOU WITH THESE EXTRA VALUE TOOLS

STANDARD TOOL CO.

THE STANDARD TOOL CO.
CLEVELAND

Warehouses: New York · Detroit · Chicago

SAVE THESE 8 WAYS WITH LAMINUM* SHIMS!

LAMINUM shims are laminated shim brass or steel built into a "solid", unit structure by an exclusive process.

Simply p-e-e-l for your adjustments. No machining, filing or grinding required for accurate factory assembly or service adjustments.

The remaining "solid" shim is always uniform in gauge, with a hard surface . . . clean and smooth as glass.

1 Assembly time reduced up to 30%. No precision machining, grinding, filing, miking.

2 All adjustments made at the job by peeling laminations. No standby lathe.

3 No fumbling and counting loose, paper-thin wafers.

4 Less compressible than ordinary one-piece or stacked shims.

5 Cut to your exact specifications. Less than 1% rejects over the years.

6 Can be fitted with babbitted lugs to prevent oil and pressure loss.

7 No new skill required for use.

8 Your customer recognizes the plus value of less "down time" for maintenance and adjustment.

Send today for chart illustrating 46 money-saving, time-saving applications, detailed specifications, sample of LAMINUM.

PRECISION STAMPINGS in any quantity

Let us quote on your *difficult* stamping jobs. Our experience, tools and presses are geared for *close tolerance* production.

* LAMINUM (Reg. U. S. Pat. Off.) shims are solidly bonded laminations of .002 or .003 inch precision gauge brass or steel with a microscopic layer of metallic binder. Cut to your exact specifications.

LAMINUM
THE SOLID SHIM THAT peels FOR ADJUSTMENT

LAMINATED SHIM COMPANY, Inc.
3103 Union Street Glenbrook, Conn.

SHIMS SHIM STOCK STAMPINGS AN-COR-LOX NUTS

ROUND TABLE Discussion

DO MORALS AFFECT MORALE?

If a foreman applies the principles of good human relations, he will not have any trouble with the morale of the department. When men and women are working together the foreman or supervisor must remember that it is not *who* is right, it is *what* is right. He must be careful how he conducts himself so that he can set a good example. He must have equal consideration for everyone regardless of sex, and he must suggest (not order) an improvement in conduct when necessary. When the question of conduct arises between a man and woman, the foreman must talk to them in such a way that they will both want to do the thing he suggests. If he praises some other good quality before he criticizes and makes them feel important and gives them a good character reputation to live up to, he will not have to worry about their conduct during working hours.

No one wants to be told he is wrong, but you can and should use the power of suggestion. There is something good in every man and woman and if we work in their good qualities we will make the faults seem easier to correct, and the good conduct of the department seem easy to attain.

A. E. Salmons
Philadelphia 29, Pa.

•

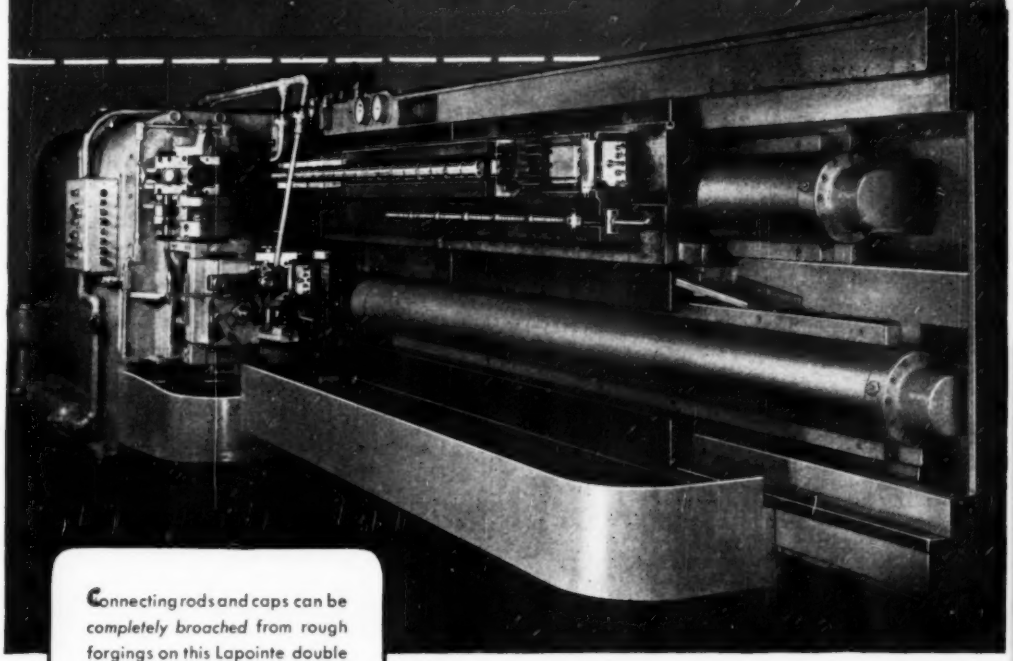
GAMBLING ON THE LONG GREEN

To attempt to formulate a definite thesis could be futile in this case; there can be so many variables. If one is in charge, or is in the senior position, one's fortunes will be largely in one's own hands. If, however, one is the junior in a venture, the position will savour of that of the man on the rear seat of a tandem; he must go where the man in charge takes him.

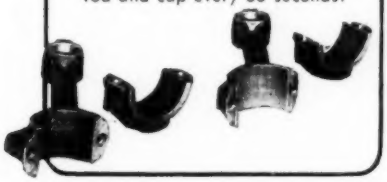
It will then become a question of the potential demand and the efficiency of the human factor. "Faint heart never won fair lady," and, one who is prepared to take risks does not put safety first or make it his only motto.

To whom is the world most indebted? To the Eds who would dis-

Because it's RIGID and RUGGED



Connecting rods and caps can be *completely broached* from rough forgings on this Lapointe double ram horizontal machine. At a cutting speed of 25 feet per minute, production is 50 pieces per hour...one complete connecting rod and cap every 65 seconds!



Low pressure hydraulic system allows as much as 66% overload

This double ram horizontal Lapointe Broaching Machine is also built in other sizes and strokes.

This newly developed 15-ton, 120-inch stroke Double Ram Horizontal

LAPOINTE BROACHING MACHINE

is exactly right for such tough jobs as broaching automobile cylinders, connecting rods, and other high production parts.

EXAMPLE: In broaching CONNECTING RODS for heavy duty truck engines, this big, powerful LAPOINTE performs all the operations formerly requiring seven other type machines! Fully automatic with push-button control, it takes the rough forging, removes ¼" stock on flat and radius surfaces, and produces the final finish.

Eliminates Lost Loading-time! Double ram feature, with snap-acting fixtures, permits continuous operation of the machine. Maximum production capacity is achieved, since one nest can be loaded while the other is broaching.

You don't have to be a mathe*magician* to figure the savings in production costs, when you can cut corners *like that!*

Send for new bulletin **DRH200-2**

THE *Lapointe* MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

Branch Factory • Edgware • Middlesex • England

HUDSON LAPOINTE MASS.

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

Buy Your Alloys by Hardenability AND SAVE

The Ryerson system of alloy testing enables you to specify alloys on the basis of desired hardenability. That means you're assured of maximum performance in the finished part. It means you avoid the danger of expensive product failure—the possible necessity of replacing unsuitable material.

Ryerson makes possible this method of alloy steel purchasing by carefully testing every heat of as-rolled and annealed alloy steel. The result: positive knowledge of the hardenability of every bar of Ryerson alloy. You can specify on the basis of desired performance, with the assurance that the alloy steel you receive from Ryerson will meet or exceed minimum hardenability requirements.

Hardenability is nothing new with Ryerson. It's been a Ryerson service for ten years now—part of a system designed to assist your buying and assure the correct application of all alloy steels. Take advantage of this *complete* service and contact Ryerson for prompt shipment of all alloy needs.

Joseph T. Ryerson & Son, Inc. Plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles, San Francisco.

Principal products: Bars—alloy and carbon, hot rolled and cold finished · Structurals · Plates · Sheets · Mechanical Tubing · Boiler Tubes · Stainless Steels · Babbitt Metal · Machinery and Tools · etc.

RYERSON STEEL

courage enterprise or the Reynolds who are willing to risk existing ease and comfort in their desire to break new ground. In the latter class will be found a whole galaxy of adventurous spirits, all bent on the great adventures. These are too numerous to mention, in science, exploration on and under the sea, in the air and on land. Industry no less has made its contribution; Eastman, Woolworth, Ford, Lever, Nuffield—to mention but a few. Small beginnings to big business. Good luck to Reynolds and all his type; labor has always taken its risks, and often made its mark.

J. E. Powell
Lindum, England

•

THAT'S MY BABY!

It was thought for a while that for a nice change one was going to be able to agree with Ed. However, though not as vociferous as usual and this time taking the "affirmative," he still has that side of a problem with which one can definitely take issue.

Make no mistake, discipline of personnel of the "line" rests entirely with the foremen; after all that is their primary function. The machinery, tools, equipment, materials or what-have-you necessary to the manufacture or production of the product and the necessary drawings and/or specifications are supplied by the owners or top management. With these there can be no quarrel, they are, or they aren't adequate to the task. Naturally at this point success depends on the degree with which they "are." Variables are kept as much as possible at a minimum. Machinery operates in the way in which it was designed, or it doesn't. Material is to specification or it isn't. However to bring the two together and get the utmost in service from the one and finished good product from the other requires the efforts, skill, touch, or control of the greatest variable of all, the human element.

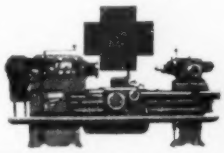
While the provision of plant, equipment and materials are problems in themselves, they may be handled in vast numbers or quantities by an individual, depending on his organization energy and acumen. But when dealing with labor, dealing successfully that is, the saturation point for efficient direct individual attention is soon reached in relatively low numbers. Hence the appointment of group leaders, sub-foremen, foremen, assistant superintendents, etc., with every good intention that

AXELSON FIRST CHOICE

MASTER MACHINISTS AGREE... there is no finer engine lathe than an AXELSON. Designed by men who are themselves master toolmakers, AXELSON lathes embody every feature that contributes to faster production, more accurate work, easier and safer operation, and maximum versatility.

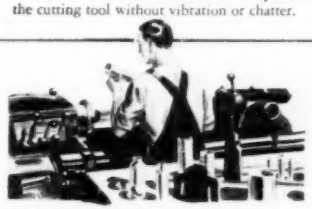
THE "FEEL" OF PERFECTION... is immediately apparent the first time a machinist puts the tool to the work in an AXELSON lathe. Velvet smooth control action... Continuous flow of power at the cutting tool without vibration or chatter.

THE TOOL CARRIES THROUGH... with precision accuracy from the beginning to the end of each cut. Massive construction throughout to maintain absolute alignment... Perfectly mated bearing surfaces on slides and ways... Heavy duty anti-friction bearings... Hardened and ground alloy steel gears... Rugged headstock, apron, tailstock, and gear cases.

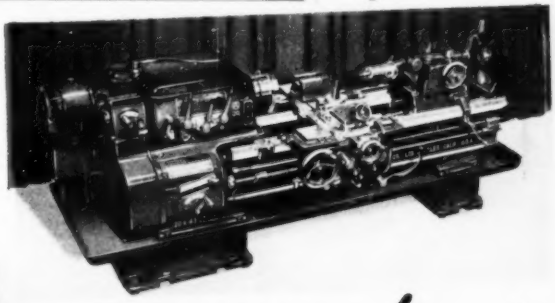


BUILT-IN SAFETY... protects operator from injury, tools from breakage, and work from the reject bin. Handwheels, levers, and other controls located within easy sight and reach of operator... Extreme rigidity and absence of backlash protect costly cutting tools... Positive automatic force-feed lubrication to gears, bearings and ways preserves original precision accuracy.

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY



PRACTICAL VERSATILITY... permits a wide variety of operations with all types of tools, on any kind of stock... Two-speed tailstock... Wide range of feeds and speeds instantly available... Ram type turret, power rapid traverse, micrometer carriage stops, relieving and taper attachments, and many other accessories available for added versatility.



AXELSON *Lathes*

DEPENDABLE FOR A THIRD OF A CENTURY

AXELSON MANUFACTURING CO.
LOS ANGELES 11 • NEW YORK 7 • ST. LOUIS 16

Authorized Distributors in All Principal Industrial Centers

FREE
TO PLANT EXECUTIVES
Complete illustrated descriptive literature tells the story of Axelson's Lathes. Write today on your company's stationery.

For Round and Straight Bores Uniformly Sized and Finished

MICROHONING* TOOLS

MICROHONING *is the* QUICKER—BETTER LOWER COST METHOD

MICROMATIC MICROHONING TOOLS

in the range of bore diameter sizes from ¼" to 42", and up to 75 feet long, correct error and generate final roundness and straightness within limits of .0001" to .0003", either by AUTOMATIC or operator control—remove up to .080" stock at rates up to .012" per minute on diameter—and any desired type of surface finish. They are designed and constructed to meet the needs of economical precision production. We can mail further information.

*Trademark Reg. U.S. Patent Office.

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVE. • DETROIT 4, MICHIGAN

Los Angeles, Calif. • Houston, Texas • Rockford, Ill. • Guilford, Conn. • Brantford, Ont., Can.

those on one rung will deal only with the step immediately below as much as possible.

Since the comparison of such an organization to a pyramid is all too obvious, it requires little to carry the similarity further, or dwell on the comparison at length. As with this structure the keystone is at the top and while the mechanics of erection starting here are not chronological, for reasons of discussions they may so appear.

Briefly, were this keystone not equal upon the sides and square at the base, those abutting would either have to compensate by the extension of this facet or the cramping of that. Were such a condition constant, the situation would not be so bad, casual examination as made by a "tourist" would reveal only the symmetry of the whole. However, since nothing about this structure is really "fixed," one must expect as the keystone extends or retards its "sphere of influence" the abuttings, secondaries and so on must reflect this either in transmittal or during momentary absorption, which may or may not carry clear to the base. Carrying the analogy still further, we come to realize that not only would the "sections" under such pulling and hauling reach a point of "fatigue" and rupture, but since these "ripples" could hardly be going on upon all sides at the same time (in fact, one can readily conceive one to be "giving" when the other is "taking") a condition easily conducive to the wrecking of the whole would soon arise. Outwardly, the appearance at collapse is still that of a pyramid; from a distance the outline is the same, and only "structural analysis" reveals those "crushed" within and the key askew.

And so it shall be with our organization where the picture of direct contact between the peak and the base is not only ludicrous but impossible.

Top management has enough to do policing its immediate area without becoming directly concerned in Tom, Dick and Harry's advent to the "Star Chamber" at half after two some Wednesday. Peculiarly enough, the very ones whose managerial minds are cluttered with minuscule details such as this, whose appetites cry for it, are the very ones who can ill afford the energy. Similarly you won't find a man who earns $25000 a year and plays golf when he feels like it having to be hailed from the golf course to open the petty cash for tuppen'orth of stamps. He has the time because he made it out of a good organization, and being that

smart he'll surely keep it that way

Absenteeism is at the outset an individual affliction. Let the one next in line stamp it out. If it spreads, remove the "stamper" and replace him with someone who will remedy it.

In other words, you made the man a supervisor—now for Gawd's sake let him supervise

A. M. Elliott
LeRoy, N Y

•

GOOD MORNING TO YOU

Every executive should take the time to talk things over with the foreman and all other workers if he wants to be successful in dealing with people. He should have a "Good Morning" for all he meets, and he should have the foreman and supervisors trained to do the same thing. They will soon find that their associates will go out of their way to help them.

If we want to handle a grievance, we must first learn how to handle the aggrieved. One of the best ways I know to handle a grievance is to smile while listening to one.

It has been my experience that a smile and a cheerful greeting by all branches of management will go a long way toward getting things done. It is also my opinion that every man in every shop is an associate and should be treated as such. A good business manager I know told me he knew the names of 50,000 people and that he could call them all by their first names. He further stated that a man's name to him is the most important word in the English language.

Let's have that smile and that cheerful "Good Morning". As Abe Lincoln remarked, "Most folks are as happy as they make up their minds to be."

A. E. Salmons
Philadelphia 29, Pa.

•

PROSPECTING

If allowance be made for Ed's short-sighted, restricted outlook, it could be conceded, perhaps, that for his clouded mentality he was taking the best line to conserve the strength of his force in objecting to a man's taking a day off to look for another job. To prevent or discourage men from leaving him would be almost his only refuge, his attitude would offer no inducement to stay. And he would ask "What is wrong with my shop?" He might go further and add, "or with me?" The answer

Rolling Pipe Threads

including ANPT and Dryseal with

REED

CYLINDRICAL DIE THREAD ROLLERS

Thread rolling is a cold forging process that forms the thread by displacement of metal. It produces a uniform, smooth, precision thread at high rates of production.

A Complete Thread Rolling Service

Devoted exclusively to the design and manufacture of Thread and Form Rolling machinery and tools, Reed pioneering experience and skill is available to help do the complete job, from engineering application to final production. Technical data on bolt and screw thread standards and thread rolling practice, as compiled by our engineers, is available to interested customers.

Send us specifications of your requirements and let us supply you with complete information.

The heart of the REED Thread Roller—cam-actuated triple dies that permit the thread to be formed at any desired constant, or varying, rate of penetration.

REED ROLLED THREAD DIE CO.

Manufacturers of

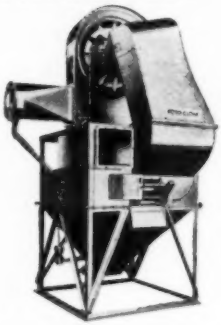
THREAD ROLLING MACHINES AND DIES • KNURLS • THREAD ROLLS

Worcester 2, Massachusetts, U. S. A.

AM 312

Could you pass this quiz on WET-TYPE dust collectors?

Important questions regarding Roto-Clone* wet-type dust collectors to which you should have the *CORRECT* answers.



WRITE FOR THIS FREE BULLETIN

Roto-Clone Bulletin 270A contains complete information on the design and application of both dry- and wet-type Roto-Clone dust collectors. Write for a copy today—it has the answers to your difficult dust collection problems.

Question No. 1—What efficiency can be expected from a wet-type dust collector on extremely fine dust?

Answer—Scores of Type W and Type N Roto-Clones are functioning daily at better than 98% efficiency on small micron particles such as found in foundry sand handling systems; ore crushing and screening; material drying, roasting and sintering operations. In fact, it is not uncommon to obtain efficiencies of 99.5% on such applications.

Question No. 2—Does operation of wet-type dust collectors require a large volume of water?

Answer—The Roto-Clone system of bringing the dust to the water makes effective use of every gallon supplied. That's why the Type W Arrangement A requires the supply of less than ½ gallon of water for each 1000 CFM of dust-ladened air cleaned.

Where water disposal is a problem, the Type N Roto-Clone is available. This unit recirculates the water without aid of pumps or nozzles. Water consumption is limited to the small amount required to provide for evaporation.

Question No. 3—Is wet-type dust collection expensive?

Answer—The cost of a Roto-Clone system is no more than that of other dust collectors of comparable efficiency. Actually, due to the small space requirements and factory method of assembly, the installed cost of a Roto-Clone is usually less.

AMERICAN AIR FILTER COMPANY, INC.
207 Central Ave., Louisville 8, Ky.
In Canada: Darling Bros., Ltd., Montreal, P.Q.

**Roto-Clone is the trademark (Reg. U. S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

®AAF

ROTO-CLONE®
DUST CONTROL EQUIPMENT

might well be—only himself. Poor Ed, he just thinks as grandpa did, and he is not far from slave-whip days. Oh, if he could just wake up and see himself as others see him! And it does not pay. You cannot dragoon good men. Is Ed the type of foreman for whom good men will work? The biter sometimes gets bitten.

The leading workman in a shop felt that his boss was getting dissatisfied and suspicious. He smelled a rat, watched advertisements and under an assumed name, in a disguised hand, made application for one post advertised, the requirements for which were right up his street. He got the job. His name was Jones, that of the new man was "Smith." When Jones returned to the shop from an outside job and reported to the boss he was told his services would not be required, further a new man had been engaged. Expecting this, he was ready and replied, thank you, and whipping out the letter engaging him said, to his astonished boss, "and here he is, Jack Smith, at your service!"

J. E. Powell
Lindum, England

•

VISITORS' DAY

About 35 years ago I belonged to a Foremen's Club. There were about 100 members, mostly foremen, although engineers and draftsmen were eligible to join. There was only one paid official, a secretary. The Club provided an opportunity to get together and discuss problems pertaining to foremenship. Discussions included the foreman's duties and his obligations to both employee and employer, as well as mechanical problems. A foreman could bring up any problem connected with his job and have it discussed thoroughly. The engineers and draftsmen among the members put in their points of view, so discussion could be most helpful.

This club did not discuss salaries or wages or grievances of foremen. These subjects were strictly taboo.

Visits to neighborhood plants within a radius of 100 miles were arranged with textile, motor-car, mine, ship-building, pottery and other kinds of industries. Each member paid his own expenses for the visit and each arranged his own permission for the day off. In most cases foremen were allowed off without loss of pay so that the only cost was transportation and frequently the plant visited provided lunch.

Many good ideas were gained

from these visits. There always is some valuable information to be gained in any plant if it is looked for.

Such visits are a great advantage to all foremen who take part, and is also of benefit to the employer! How times have changed! Years ago visitors were allowed in very few plants because the owners had the mistaken idea that they could keep secrets by not allowing visitors. Today if one wishes to do so he can get a pass to go around almost any plant and see almost any operation. Most employers also will allow foremen to be away for a day if they make necessary arrangements in ad vance to see that men have work assigned and the like, and the employer welcomes the idea of giving a substitute an opportunity to try out the job. Furthermore, most manufacturers feel that the foreman who takes a day to visit another plant is doing a more thorough job and studying his employer's interest.

Arthur Silvester
Niantic, Conn.

•

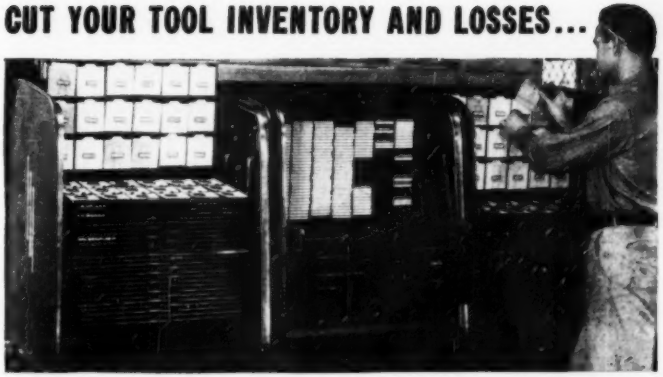
Very frequently the businessmen of a community get together at a luncheon and discuss mutual or civic problems. Other executives periodically attend technical society meetings for the purpose of learning how the other concerns are solving their management, production, or maintenance problems. Most concerns subscribe to technical publications to compare methods and procedures.

The foreman should be encouraged to attend these meetings and read the literature to develop a broad knowledge of present conditions in various plants and apply the best methods where convenient in his department. If it is possible for him to visit other plants and discuss mutual problems with the foreman there, the company should insist he attend.

Getting around to other shops, noting the type of equipment, the methods used and production figures will give the foreman an education which he could not obtain otherwise. Sitting around "chewing the fat" with the foreman host will uncover many shortcuts or ingenious labor-saving devices.

On many occasions, I have visited other shops with my employer for the sole purpose of obtaining further information regarding a certain operation or procedure. I was surprised at the manner in which we were received. Every detail was described and we were prompted to ask questions. While the bosses dis-

CUT YOUR TOOL INVENTORY AND LOSSES...



. . . Skinner Chuck stopped 'em and job delays, too, with McCaskey

No one wants to run up costs by carrying more tools than necessary in tool crib inventories. But . . . how be sure that you have enough to serve daily production needs . . . and not too many?

The Skinner Chuck Company, New Britain, Conn. found the answer and made these and other definite savings thru McCaskey Tool Crib Control, according to Clifford L. Nelson, General Foreman:

(1) A large reduction in inventory carried in the tool crib . . . with more tools actually available for use than before;

(2) Inventory and Activity records prevent having to hold up jobs waiting for the purchase of tools;

(3) Employees like the McCaskey System because there can be no question about the tools they are responsible for and no arguments when they are returned;

(4) All tools are quickly located whether in use or in the crib saving time for planners, supervisors, operators, and machines;

(5) A large reduction in tool breakage and total elimination of loss of tools, that formerly disappeared in the scrap can, results from having complete accountability and knowing the reasons for tool breakage.

Let us have a qualified representative explain how McCaskey Control will save from the start in YOUR plant . . . or send you proof of McCaskey savings in several other well-known plants.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

50 Years of Experience in Precision File-Making Behind Amswiss

AMERICAN-PATTERN FILES

For half a century, our skilled craftsmen and our special equipment have been devoted to the manufacture of "American-Swiss" Swiss Pattern Files.

With this background of experience in making these precision tools, we now offer our new line of "AMSWISS" American-Pattern Files . . . made to similar high standards of workmanship.

When you buy "AMSWISS", you can be sure of uniformly hard, accurately cut, long-wearing American-Pattern Files. The "AMSWISS" line includes a complete range of types, sizes and cuts of these files, all guaranteed to be perfect in every respect.

Write for our "AMSWISS" Catalog, with complete descriptions and listings.

Buy from our Authorized Distributor

AS-184

AMERICAN SWISS FILE & TOOL CO.
410 TRUMBULL STREET, ELIZABETH 1, N. J.

Also manufacturers of Swiss-Pattern files, milled curved-tooth files, rotary files and mechanics' hand tools.

cussed their golf scores or the corporation tax situation, the foreman and I would swap ideas on how to handle grievances, speed up and operation or new equipment being advertised.

When we returned to our offices, the boss and I would exchange notes and relate our experiences at the following foremen's meeting.

The results of another plants' trials will guide the foreman in planning new layouts, procedures, or methods. The foreman cannot rely upon all the written matter they come across on various subjects, since most authors do not include difficulties encountered or unsuccessful experiments.

More "meat" can be digested in a verbal description by someone connected with the practical application of the subject in question than a written report. When two foremen from different plants "take down their hair" and cry in each other's beer, more information will be exchanged than a couple of years of experience will uncover. By visiting another plant and actually observing the operations performed, the proverbial thousand words can be eliminated.

Frank J. Zarnowski
Rutherford, N. J.

•

WORKING THE WILLING HORSE

If a yes or no answer regarding the question of a man capable of extra effort being given the rush assignments is expected, then the answer would be "Yes," by all means, for after all schedules must be met and the work must get out.

The present-day foreman or supervisor is a busy man and has untold other duties to perform and usually assigns the rush jobs to the men capable of performing them.

This is being done every day, because a foreman's job hinges on his ability to get out the jobs on time. It is only natural for him to entrust these jobs to men who proved in the past that they can do them.

The justice of this practice is another matter. If it is possible to offer extra compensation in the form of a higher rate or extra hours of work for this highly co-operative attitude, then the foreman can salve his conscience by feeling that he is also doing something for the man. If this is not possible, then the rush jobs, as far as possible, should be allocated to the various workers. This practice should also be followed for the foreman's own protection, because it is possible for this one man to become suddenly ill

or feel in need of a few days rest and the foreman may find himself in a predicament with ca

Assigning the rush jobs to the same man all the time may also result in developing a lack of responsibility in the other men who may eventually feel that their work is not important and become indifferent to their jobs. This is an undesirable state of affairs and can be prevented by the foreman being fair in solving this problem.

Robert Knotek
University Hgts. 18, O

•

A few rare men are only happy when they're sweating profusely. Such men should be given hard tasks often enough to keep them happy, because this type works off some surplus energy and is better satisfied for having done it.

However, such a man does not deserve all the hard jobs, because there are usually some in the shop who do not know what really laborious work is like. They need the experience to round out the daily trend of monotony, thus evening up matters among the group about as well as can be done.

Under ordinary circumstances, unusual jobs should be evenly divided among those capable of doing them. When circumstances are such that it becomes necessary to lay the burden more largely upon one than upon the others, the reason should be explained to this individual and with an expression of gratification that the one involved can and will do the job satisfactory.

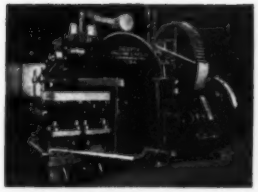
It requires a keen sense and understanding of human nature on the part of a foreman to maintain harmony among the working group under such circumstances—for which the foreman should be given due credit.

H. B. Martin
Watervliet, N. Y.

•

In every shop, there is at least one employee who comes under the "willing horse" category, an individual who can be relied upon to step above and beyond the day's routine. The fact that this man can be relied upon means a lot to a busy foreman. If he is wise he will see to it that this "willing horse" is properly handled and not overworked, or like his equine counterpart he will be sure to balk.

To cite a case in point: Some time ago I worked in a shop where the foreman was a nervous type, much given to dashing hither and yon on



BEATTY No. 11-B Heavy Duty Punch widely used in railroad industry.

BEATTY combination Press Brake & Flanger does flanging, V-bending, pressing, forming, straightening.

BEATTY CoPunShear, one unit does coping, punching, shearing.

BEATTY Hydraulic Vertical Bulldozer for heavy forming and pressing.

BEATTY Horizontal Hydraulic Bulldozer for heavy forming, flanging, bending.

we're WISE
TO A LOT OF
PRODUCTION PROBLEMS

BEATTY-*engineered* heavy metal working equipment is on the job in hundreds of important plants, doing a wide variety of jobs. Yet, each machine is individually engineered to do its specific task better, faster, at less cost. This wide range of experience is your assurance of expert counsel, advanced engineering, finest quality construction. There's a better way to handle any heavy metal fabricating problem. Our job is to help you find that better way. If you have a problem, write us. We may have the answer.

HYDRAULIC HEAVY METAL WORKING EQUIPMENT

BEATTY MACHINE AND MFG. COMPANY
HAMMOND, INDIANA

AMES

CONTINUOUS ACCURACY · RUGGED CONSTRUCTION · HIGH QUALITY MATERIALS · EXTREME SENSITIVITY · LOW FRICTION

INGENUITY PLUS - -

. . . the combination of Ames Dial Comparators shown below will allow you to handle practically all of your measuring and control problems.

No. 1 Dial Comparator. This model has a table which is adjustable for height. The lever at left of dial is pushed down to lift the indicator rack spindle. Any Ames Indicator can be attached, but the one regularly supplied is Model 202 with dial numbered 0-100, reading .001", having .250" range.

No. 13 Dial Comparator. The 8" x 8" cast iron base can be fitted with locating fixtures and V-blocks. The bracket supports any Ames Indicator, but regular equipment is Model 202 with dial numbered 0-100, reading .001", having .250" range. Bezel and dial turn to locate zero beneath pointer.

No. 2 Dial Comparator. Compact. Regular or dead weight contact pressure. Table dia., 2". Adjustable for "0" setting. Height $5\frac{3}{16}$"; weight $2\frac{3}{4}$ lbs.

No. 26P Dial Comparator. For indicating the most minute variations in size of duplicate parts. Supersensitive Fan Head Dial Indicator graduated in .00005". Total range .002". Adjustable tolerance hands and diamond contact.

No. 130 Dial Comparator. Especially designed for checking comparatively heavy parts. Size of base and length of upright post to suit customer's requirements.

Address inquiries to Home Office, 26 Ames Street

B. C. AMES CO. *Waltham 54, Mass.*

MANUFACTURER OF MICROMETER DIAL GAUGES AND MICROMETER DIAL INDICATORS

Representatives in principal cities

HARDENED STEEL GUIDEPIN AND BLOCK · FORGED BRASS CASE AND STEM · HARDENED STEEL BEARINGS · FORGED WHEEL SUPPORTS

the slightest provocation. Working for him—and I mean *working*—was a mechanic whom I'll call Pete. Pete was a personal friend of this foreman and this may account for the forbearance he exercised toward the boss. Be that as it may, no hour of the working day was complete without the foreman sticking his head out of the office and hollering for Pete. At first this "popularity" of Pete's was resented in a mild sort of way by the rest of the shop force, as Pete would drop whatever he was doing and dash for the office. But as time went on it became a standing joke; the shop wits would vie with one another in inventing the most absurd reasons for Pete's latest summons before the boss's clarion voice had died away. If Pete heard those asides—and his hearing was quite normal—he ignored them.

Maybe he was biding his time, the seed of revolt was not ready to germinate, or the worm not ready to turn. Whatever the reason, it took a stewing hot weekend in mid-June to bring him to his senses. A certain piece of equipment had to be torn down and repaired, ready for the production line Monday. Old Reliable Pete, of course, was slated for the assignment and rather grudgingly, the boss granted him a helper.

Came Sunday and the sun beat down on the just and unjust alike. Pete's helper, not being of the same noble breed as our hero, failed to appear. He pleaded indisposition the following day, but the shop grapevine had it that he had adorned the bleachers of the local ballpark that fateful Sunday, well fortified with cold malt liquors. Singlehanded, Pete worked through that wilting day and finished the job in time for Monday.

He dragged his weary bones to bed that night with his loyalty beginning to strain at the seams. Overtaxed by the day's efforts, Pete's slumbers were so profound he overslept, got to the shop an hour late, and immediately repaired to the foreman's office to report on the doings of the previous day.

He arrived at a touching moment. The big boss was present and commending the foreman for his "efforts" in regard to keeping the equipment maintained without loss of valuable production time. The foreman accepted the praise with becoming modesty, mentioning in a few well-chosen words his belief that a thing promised should be accomplished, whatever the cost. At no time in his oration did he mention that Pete had borne the burden

and the heat of that particular Sunday. Pete might as well have been not present at the eulogy.

The big boss took his departure and Pete made his report. Now, he thought, comes a few words—at last—of commendation for a job well done, an uphill battle well fought. Who knows, perhaps a little extra in the take-home envelope at the end of the week? He waited in vain.

The foreman riffled through a pile of papers on the desk and came up with a card. It was a routine official communication from the front office, with Pete's name and clock number typed thereon, stating that he had been late for work three times in the current month. Unless a satisfactory explanation could be given, disciplinary action would be taken. "What are we gonna do about this, Pete?" was the inquiry. Then the lid blew off! When Pete had finished telling him what he could with and about the card, a beautiful friendship lay in ruins, Pete was headed for the paymaster with his toolbox under his arm, and the company had lost a valuable employee.

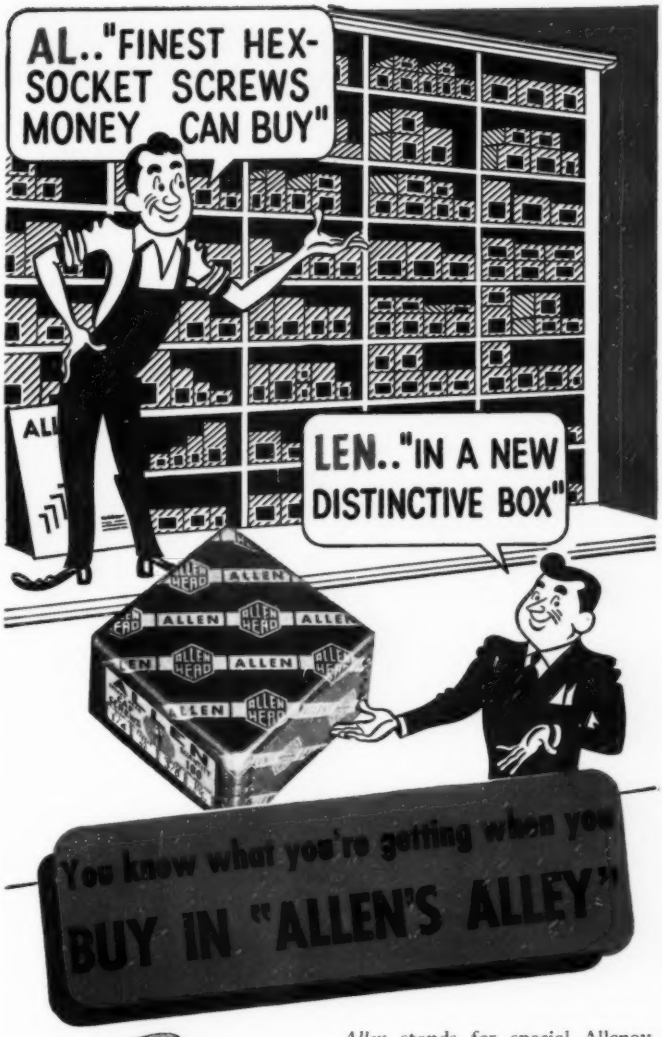
Although all foremen are not as selfish and obtuse as the individual I have mentioned, the moral is obvious. If you have a man like Pete working for you, show your appreciation and respect. You don't have to coddle him, or have him at your beck and call every hour of the day. Save him for those extra-effort jobs you know he is capable of. To carry the horse analogy a little further, keep him "under wraps" a little and pick his spots. You don't enter a Citation in every little claiming race that comes along!

Robert S. Alexander
Greenville, R. I.

•

The method of selecting a "work horse" and using the individual is one practiced and misused in almost any type of production work. There are always those "deadline jobs" that must be gotten out at all cost, and it is usually the fate of the ambitious worker to have these rush orders heaped upon his bench. It is not the fact that he is the exceptional man around the shop, the only one who can undertake the task, but that he is willing to do anything asked of him and past experience has proved he can complete the order in the time allowed. My concept of this type of worker is that his value to the organization be recognized and some care taken to see that he does not sour on the job.

There are generally others who, if


AL.."FINEST HEX-SOCKET SCREWS MONEY CAN BUY"
LEN.."IN A NEW DISTINCTIVE BOX"
ALLEN HEAD
You know what you're getting when you
BUY IN "ALLEN'S ALLEY"

If the shelves in your distributor's hex-socket screw section display row on row of the new, distinctive black box with the silver bands, you know you're getting *genuine Allens*, not just Allen-type hex-socket cap and set screws.

Allen stands for special Allenoy steels, for complete facilities for threading by any method, for the latest forming and heat-treating techniques, for quality control, and advanced engineering. You get all these advantages in one package, if you make sure that package is the new black *Allen* package with the silver stripes.

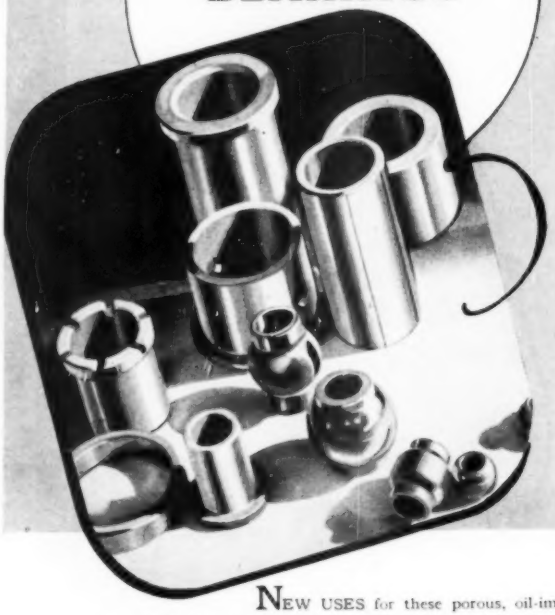
SOLD ONLY THROUGH LEADING DISTRIBUTORS

ALLEN HEAD

Hartford 2, Connecticut, U.S.A.
NEW YORK, CLEVELAND, DETROIT, CHICAGO, LOS ANGELES

POSSIBLY YOU, TOO, CAN USE LOW COST

Self-
LUBRICATING
JOHNSON
Ledaloyl
BEARINGS



NEW USES for these porous, oil-impregnated bearings are being discovered every month. They answer the long-felt need in applications where it is difficult or impossible to supply adequate lubrication. They may even be sealed in place. Johnson Ledaloyl Bearings can be used, too, for their low cost in many applications where heavy duty service is not a factor. Being molded under high pressure from powdered metal, they are much lower in cost than machined bearings, particularly in odd-shaped, flanged and self-aligning designs, and in large quantities of a size. You, too, may find practical uses for them and benefit from substantial savings.

JOHNSON engineers are glad to assist you in determining whether you can use Ledaloyl bearings to your advantage. Write today!

Ledaloyl BRONZE

Johnson Bronze
SLEEVE BEARING HEADQUARTERS
515 SOUTH MILL STREET · NEW CASTLE, PA.

given the opportunity to excel in the high standards expected on this type of work, will tackle the job with zeal and bring about a better working understanding among the personnel. By having several "hot job" men in the shop, discussion during the breeze sessions will center around these special workings and the result will be a mutual understanding of the problems, as well as the known fact that a sharing of methods and ideas is the least costly and most practical method of solving any task.

Not only will the concern gain by this friendship, that will replace the envy of unselected workers and the "beefing" of the man appointed to the job, but also the respect the workers have for their superior will be greater. A shop that has more "family feeling" and less of the frictional disputes that wrack so many of today's industries will be the one in which the personnel feel secure in their positions—and the calibre of work will be the envy of all competitors.

Jack Bell
Bakersfield, Calif.

•

I think Ed is entirely wrong in giving all the rush orders to Williams. It is not fair to Williams and it would not look right to the department. Tough jobs as well as rush jobs should be divided equally among all personnel.

This is one of the first principles of good human relations, and when the rates are all equal so should the work be equal. We all recognize the fact that there are some employees more skilled than others and others who are just a little faster. Regardless of this fact, if you place too big a burden on one man, he will eventually be rankling with discord and ill feeling. Should this man resign, the whole department would blame you and this would show up in both production and quality. In this changing world, we must have consideration for the other fellow's feelings, as well as his ideas. Give honest application for a job well done and you will have no trouble getting the rush jobs through regardless who you pick to do the job.

In my opinion, we must talk in terms of all our employees' interests. One of the most important things we must learn in dealing with people is fair play. I believe Ed should praise some good quality in some of the other employees, then give them some of these rush jobs. I would be willing to bet he would get the jobs done when he wanted them done.

and the hard jobs would seem easier to do. There is no other way than to have equal consideration for all employees, for faster production and better quality. In the final analysis of this problem, "It ain't *who's* right; it's *what's* right."

A. E. Salmons
Philadelphia 29, Pa.

•

Apparently Williams is a good fast man and good natured—too much so for his own good, for Ed has apparently taken advantage of Williams on many occasions. Evidently Ed's idea is to get the work out by hook or by crook, even if it means being totally unfair to the other fellow. He should, instead, spread the rush jobs out among his men and thus avoid discontent and unfairness in the shop. To concentrate on one man is totally unfair.

Many men would protest if in Williams' position, but others would simply look for another job as Perkins apparently did. When a man leaves it is a distinct financial loss to his employer and costs real money to replace him, a fact which Ed apparently does not understand. Ed does apparently realize, however, that he is taking advantage of Williams because he at one point says if he is "fool enough to do the work."

A foreman who is unfair to one man is unfair to all, and the other men will notice it. Such unfairness will sooner or later jeopardize the foreman's own job.

It is only fair to Wililams if he is being used as a pinch-hitter to raise his wages above that of the regular rate. This will be good business for the employer as well.

A good method was used in a 60-machinist plant many years ago. There were always two or three fellows on rush jobs, usually altering a die, making a special bolt or fixture or otherwise modifying production methods. A checkup indicated that about $300 per month were spent on such rush jobs. It was decided to delegate all rush work to two of the fastest and most efficient men. Most machinists were on a piecework basis and averaged time and a third. These two fellows were guaranteed time and a half for any rush jobs. This arrangement was in vogue for many years and was highly efficient in many ways. These two men amassed a great amount of equipment for doing such special jobs and by doing the same job over again when it occurred, they saved the time to develop the necessary tools. Also

Are You Paying Too Much for Precision?

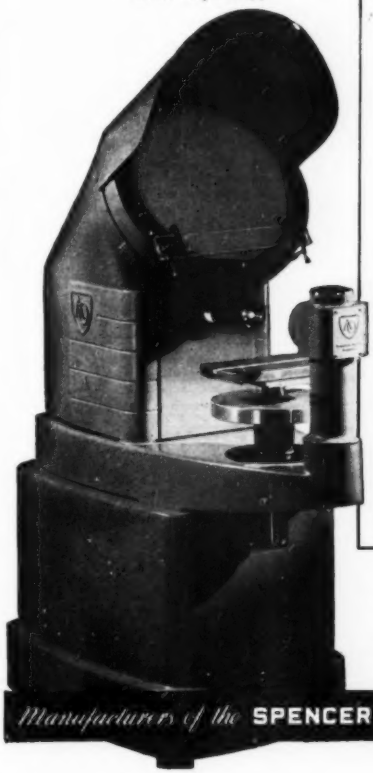
You can cut labor costs, reduce scrap, and maintain closer tolerances with the

NEW AO OPTICAL PROJECTION COMPARATOR

Here is an instrument so advanced in accuracy and convenience that it opens new possibilities for optical projection comparison in parts inspection and tool and gage measurement. Developed by one of America's most respected builders of scientific optical instruments, the AO Comparator offers many long-sought features:

The basic AO Comparator speeds inspection of parts on the production line. For mounting on a bench, it is available without the portable base.

For further information, write Dept. P157



Uniform Magnification Without Distortion
for unequalled measuring accuracy.

Greatly Increased Illumination
valuable advantage at all magnifications.

Coated Precision Optics
for crisp definition, brilliant image contrast.

Cool, Sturdy Lamphouse
Forced ventilation throws heat down away from operator.

Choice of Magnifications
Objectives quickly interchangeable without adjustment.

Mirror—Factory Positioned
No adjustments needed.

Bulb—High Intensity, Prefocused and Precentered,
changed without adjustment.

Light Weight Cast Aluminum
Easily moved on retractable casters.

Efficient Work Table
Rapid fingertip focusing, with 4" vertical travel.

American Optical
COMPANY
Scientific Instrument Division
Buffalo 15, New York

Manufacturers of the SPENCER *Scientific Instruments*

QUICK ACTING
JOHNSON FURNACES

REDUCE
TOOLROOM BOTTLENECKS

Heat treat high speed steels, tools and dies in your own plant at low cost

Reduce unnecessary lost time waiting for tools and dies. Heat treat high speed steels, harden high carbon steels, braze carbide tipped tools in your own plant. *Quick Acting* JOHNSON Hi-Speed Furnaces are ready for action to produce high uniform temperatures FAST and at remarkably low cost. Pay for themselves by saving time and gas. Wide temperature range easily regulated with accuracy. Write today for complete literature describing all *Quick Acting* JOHNSON Furnaces. There is a size to meet every toolroom requirement.

Furnaces described are complete with Carbofrax Hearth, G. E. Motor, and Johnson Blower.

QUICK ACTING

JOHNSON No. 120 Hi-Speed
1300° F. in 3 Minutes
2300° F. in 30 Minutes
Firebox 5 x 7¾ x 13½. Two burners
$145.50 F.O.B. Factory

QUICK ACTING

JOHNSON No. 70 Hi-Speed Bench Furnace
2250°F. in 30 Minutes from a cold start.
Treats all steels. Firebox 5 x 7¾ x 9. Two burners
$105.50 F.O.B. Factory

QUICK ACTING

JOHNSON No. 130A Hi-Speed
For steels requiring 1400-2350° F.
Firebox 7 x 13 x 16½. Four burners.
$295.00 F.O.B. Factory

JOHNSON GAS APPLIANCE CO.
589 E. AVENUE N.W., CEDAR RAPIDS, IOWA

COMPLETE JOHNSON CATALOG
Write for FREE Catalog describing all time saving, cost cutting JOHNSON Furnaces for pot hardening, melting, annealing, and heat treating purposes

it avoided breaking men in, in each case, and the possibility of a spoiled job.

Chances are that sooner or later some executive will notice that Williams is always alert and working as he passes through the shop and will suggest to Ed that he make him his assistant. That will be the acid test for Ed and may prove that Williams was not such a fool after all, because his willingness to work has then helped him to get ahead.

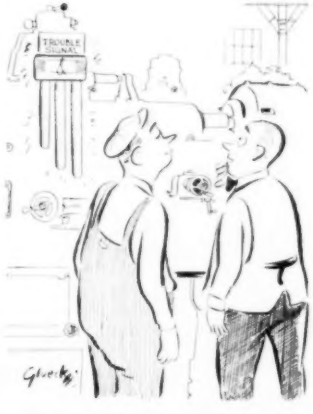
Arthur Silvester
Niantic, Conn.

•

It seems proper to accept a man's willingness to be of extra help and service to an employer, and it indicates the man's interest in the well-being of the company as well as his own ambitions. However, such special effort and loyalty should be compensated for through extra pay and also special considerations, otherwise the end result may be a disgruntled and unsatisfied worker.

It may be well to consider him a leaderman and pay him leaderman's wages, say 10% to 15% extra, even though he is not in charge of other men. Then he should also be taken into some confidences and made to know that the company depends on him and appreciates him, and that he is really a part of the organization and not just so much labor commodity. It would be wise on the part of the company, though, if there would be several dependable employees available, for it is entirely possible that the man may quit or become sick, which may leave the foreman in an awkward position.

Also, the man's new pay scale should be permanent. It is easy to



"Well, whada ya know, chimes!"

raise a good man's pay, but it may cause a considerable amount of ill feeling to lower it later on, even if advisable. A man should therefore have proved his diligence, loyalty, experience and dependability before he is given the higher rate.

Alfred O. Bell
Berkeley, Calif.

•

The question of whether or not to overwork the willing horse can be answered easily merely by applying simple logic. In most situations where one man can always be depended upon to meet emergencies, you will find that, regardless of his willingness, his paycheck is no greater than that of the rest of the workers. So it becomes necessary to analyze the reasons why this one man is willing to be imposed upon.

If he is "fool enough" to accept this more or less unfair state of being called on all the time, then there must be a good reason. If the foreman is wise enough to hold his job as foreman, he had better reason out why.

First of all, the man could be a willing horse because he is anxious to please. He is anxious to please because he desires to better his position. This may be in the form of a personal recognition or a merit pay boost.

Secondly, he may harbor a fear of losing his job or of at least incurring the ill will of his foreman if he refuses.

Thirdly, he may be truly desirous of just being a good fellow and will help the "boss" out of a tough situation. He may really like to see his company meet emergencies and is willing to be overworked to see the emergencies met.

Fourthly, he may be nothing more than easy-going and would rather be imposed on than have an argument.

Now to break these points down: If the man falls under the first category, he is a valuable man. He realizes that when the company prospers, he can also prosper, so he leaves no stone unturned to gain his end. But when he is imposed on time after time merely because he is willing, yet still gains nothing from it but the distinction of being "teacher's pet," he will become soured. Although he may seem unchanged outwardly, he is looking around for a company that will recognize willingness in a man and reward him accordingly. A man of this type should be given pay boosts for merit, or else the rest of the workers should be called upon equally to meet emer-

ANNOUNCING

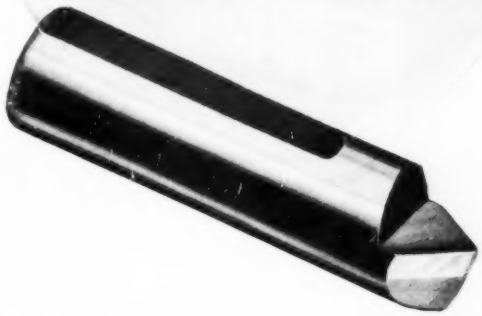
A Money-Saving Tool

Service to users of

HEALD *and* EX-CELL-O

Precision

BORING MACHINES



WE'RE in business to save you money . . . by producing single point carbide boring tools exactly to your specifications at unusually attractive prices. These tools can be shaped not only for boring but for facing or chamfering as required.

We are talking price because that is the outstanding advantage offered in our highly specialized service. We are set up with production methods and equipment geared to one objective . . . high quality at low cost. No premium is charged for the shape required, and prices are based solely on the diameter of stock and its length.

The easiest way to prove the value of our service is to send us blueprints of the boring tools you require and let us make them up for you. Our catalog, available promptly on request, will give you an idea of the sizes on which our production is concentrated. *Write for your copy today.*

●

We are prepared to furnish Precision Carbide Boring Tools in a wide range of diameters and lengths . . . to customer specifications.

INDUSTRIAL CARBIDE TOOL CO., Inc.
22 Mercantile Street WORCESTER 8, MASS.

Lovejoy Type "A" milling cutters are unsurpassed for removing metal quickly, accurately and smoothly. And a big PLUS feature is blade design—H.S.S., carbide and cast alloy blades are interchangeable in any Lovejoy Type "A" housing ever built—from 4½" to 42" in diameter! No need to carry a large stock of blades because Lovejoy gives immediate delivery from its own large stock.

Another asset is Lovejoy's exclusive "positive-locking" device. This means that a minimum of stock must be removed when sharpening blades. It allows use of a large percentage of each blade. It holds blades immovably even during heavy intermittent cuts.

The Lovejoy man near you will be pleased to give details and production estimates on your own work.

"TOOL BITS"

Type "A" face mills are available for all standard arbor mounts (National and Lovejoy) and standard spindle mounts (National, Ingersoll, Universal, Giddings & Lewis and Lucas). Details will be found in Lovejoy Catalog No. 28. If you have unusual jobs requiring special cutter designs, call on Lovejoy the "specialists on specials."

Lovejoy
TOOL COMPANY, INC.
SPRINGFIELD, VERMONT

Write for Catalog No. 28

gencies. Undoubtedly, there are many other willing men in the department, if the foreman would only ask them. But having called upon the willing horse once and received quick response, the foreman settles back and thinks that he now has a stooge to work.

If the man comes under category number two, he is a poor man to have around or else the foreman is incompetent. No man should have to fear for his job. A fearful man cannot be trusted to do his normal work well and will fold up when you need his ability most. Willingness through fear is a mental and physical hazard to the rest of the workers as well as to the fearing individual. If he is just a good fellow and likes his company and his work and wants to help out, he will soon realize that the foreman is the one that is the fool and will either begin to look for another job or will cause trouble by keeping an undercurrent of sour malcontent brewing among the workers.

The fourth category speaks for itself. The man who can be imposed upon regularly without ever rebelling, who receives no consideration for his feelings in the matter, is a man who will become a drudge and will end his life in the same plane that he started it.

America was founded and built and is constantly maintained through the willingness of Her workers. Every man who desires to exert himself a little more to get a difficult job mastered is the man who is typical of the people of this country. There can be no time for laziness or neglect, and the foreman who is willing to shoulder all the emergency responsibility on to one man is neith-

"I'd like a machine with some vibration to it—reducing you know."

er American nor is the worker American. In this country we all have certain rights, and a respect of those rights forbids any foreman to impose and any worker to permit himself to be imposed upon.

In the situation discussed between Ed and Al, it is not the "willing horse" who is the "fool," but the foreman because he permits himself to take the line of least resistance by always calling on the "horse" and by letting the man become such a person.

D. W. Hartzell
Eng. Div., Bryant Heater Div.
Associated Gas Equipment
Cleveland 10

•

IS BUSINESS, BUSINESS?

Were Al's department part of a union shop agreement, his choice would be made for him. Union rules require the discharge of the last employed worker. As, however, this arrangement evidently does not prevail, termination of services must be decided by Al himself.

But he is confronted with more than just a choice between two workers of equal ability. On the one hand, the employee with longer seniority is more or less a lone wolf, unmarried, a frequenter of taverns, uncharitable where worthy causes are concerned, and is unwilling to take part in community affairs—in short, a completely self-centered individual.

On the other hand, the more recently hired employee is a married man with a family, a church member, and active in Boy Scouting, as well as being community-minded in other affairs.

Were I in Al's place there would not be much doubt in my mind as to which worker would feel the ax. I would keep the more social-conscious worker and let the other go, for by and large, we must take into consideration man's worth to society as a whole, and he who contributes more in this respect is deserving of a better chance to advance in that society than is a person whose first and last thought is only about himself, regardless of how good his work may be otherwise.

Milton E. Sussman
Brooklyn 20, N. Y.

•

There can be no question as to Al's being right in deciding to let Smith go if and when he has to drop one man. There is too much stress laid on seniority in all walks of life, up

Do you recognize these HOLTITE fastenings? Guess what industry uses each of them. Check yourself by the list below.

CONTINENTAL makes them all and thousands more

Of all the 400,000 varieties of fastenings that literally hold our industries together, Continental makes a large proportion marketed under the famous HOLTITE trade name. Most of them are standard — screws, nuts, and bolts for every use in every industry. Others like the well-known HOLTITE-Sems and HOLTITE-Phillips screws are patented specialties and the famous HOLTITE-Thredlock, Locktite and Tap screws were first designed and produced by HOLTITE. Sometimes a fastening engineered by HOLTITE for one industry finds an unexpected use in another. Often a HOLTITE-*Engineered* fastening will replace several parts that a manufacturer is using. Why not discuss your fastening requirements with a Continental Sales-Engineer. He will focus on your requirements all the broad industrial-fastening experience and ingenuity of Continental. Remember Continental is constantly improving HOLTITE products, lowering their cost and broadening service.

ENGINEERED FASTENINGS FOR PRODUCT ENGINEERS

A. HOLTITE-Phillips Type "H" Brass Tap (coarse thread—patented slotted point) Screw designed to eliminate taps and tapping operations in fastening polystyrene refrigerator assemblies.

B. Hex-head lag screw, a special development for fastening metal to wood in aircraft assemblies.

C. Special shaped screw to hold sections of home utensil in alignment by small lug at end of thread. Assures proper assembly of utensil after cleaning.

D. HOLTITE-Phillips Set Screw, used in assembling glass panel store fronts. Eliminates driver damage to costly polished panels. Screws made of Aluminum, Stainless Steel or Silicon Bronze to prevent staining.

This Trademark HOLTITE T. M. REG. U. S. PAT. OFF. *means made by—*

CONTINENTAL SCREW COMPANY

1904 NEW BEDFORD, MASS., U.S.A. 1949

Let PERKINS' GEAR SPECIALISTS save you money!
A considerable amount of all types of equipment in use right now has been built at less cost and operates more efficiently because Perkins' engineers checked the original blueprints and specifications prior to manufacture.
Broad experience both in the application and manufacture of all types of gears has equipped our engineers to bring to your project a highly specialized knowledge of gear transmission. The recommendations made by our technicians have frequently made it possible to add to the performance of the gear transmission while, at the same time, effecting substantial savings in production.
To anyone with a gear problem involving design, manufacture or installation, this same practice will prove advantageous, and to them this engineering service is offered.
YOU FURNISH THE SPECIFICATIONS WE'LL PRODUCE THE GEARS
Perkins makes, in all materials, metallic and non-metallic:
Helical Gears
Bevel Gears
Ratchets
Worm Gears
Spiral Gears
Spur Gears
Ground Thread Worms
Perkins Machine & Gear Co.
Springfield 2, Mass.

to and including the U. S. Senate. It makes an easy "out" for foremen, but it is not good management. This does not mean that length of service should not be carefully considered in cases of this kind. But the *kind* of service is as important as its length.

While we usually consider this in terms of the shop itself, Al made a good point by bringing in the influence that Thomas had outside of the shop. All these things do affect a man's value to the shop as well as to the community. Strict adherence to the seniority rule has been responsible for many poor foremen who have been promoted simply because they stuck to the job. It has cost manufacturers many dollars in inefficient shop operation.

Length of service should have full consideration. The knowledge of the work which a man accumulates can be of great value. Dependability is a real asset and should be rewarded. In compensation and in retirement pay, length of service should count heavily in a man's favor. *But it should not be the only deciding factor.* It is probably a natural assumption that length of service should make a man worth more, and it does in most cases. But there are other factors which should also be considered, as Al did in his talk with Ed. The morale of the community in which a shop is located has a direct bearing on welfare of the shop and of its success.

Fred H. Colvin
Point Pleasant, N. J.

"Quotes"

Think of Your Employees

MANAGEMENT INTEREST in better employee relations and greater team spirit is spreading. For evidence, look to the auto plants.

At General Motors, various divisions, for more than a year, have been inviting both employees and local citizens to visit the plant during "open-house" activities. These visits do a great deal not only to improve worker relations but also to foster community understanding of the work being done in the plant.

Somewhat narrower in scope is the program recently announced by George T. Christopher, president and general manager of Packard Motor Car Co. The new policy provides that 750 members of the super-

visory staff will no longer be required to punch time clocks, wear badges, or work overtime (unless essential). In addition, each will have a 3-week vacation, instead of two.

Apparently designed to obtain closer liaison between supervisory personnel and management, the new arrangement applies to administrative executives, executives, supervisors, and staff members; the latter group includes professionals and specialists who assist the supervisors.

Another feature of the plan provides for quarterly meetings of these supervisors at factory expense. These "get-acquainted" meetings are expected to help unify the whole factory management team.

Kaiser-Frazer is a third manufacturer that has taken steps to keep employees better satisfied. According to Edgar F. Kaiser, vice president and general manager, the corporation has installed the largest public address system in the world, consisting of 600 speakers to carry information to some 16,000 employees. The system will be used to keep employees abreast of the latest news and sports developments, to provide entertainment, and to broadcast reports of area weather and highway conditions during winter months. In addition, it will be an invaluable safety feature in case of emergency.

•

Efficient Handling Produces Many Benefits

"FROM MANAGEMENT'S VIEWPOINT, there are many and important economic reasons why efficient materials-handling methods deserve thoughtful consideration," said Stevens H. Hammond, president, The Whiting Corp., speaking before the Materials Handling Conference arranged by the Materials Handling and Management Division, ASME.

"Wages, today, are at an all-time high. Average weekly earnings for all manufacturing industries were $52.07 for March, 1948 (BLS figures). Any device that can save the time of one man will not only earn $52 a week in wages, but, in addition, the extra investment per worker for training, social security, insurance, supervision, retirement funds, etc. Thus, it is not unusual to be able to justify an investment of $10,000 to $20,000 or even $25,000 for equipment that will replace a man on the payroll.

"There are other benefits to be obtained from efficient materials handling that are even more important.

He didn't forget . . .

He just took a chance!

When workers risk their eyes, with disastrous results to both themselves and the company alike, it's time to look into the cause of unsafe practices.

Goggle Style TAW51

WILLSON answers the problem of getting safety equipment worn by designing the utmost comfort into their entire line of eye and respiratory protective devices. The goggles illustrated have eyecups that are molded to fit the bony structure around the eyes. The chain bridge and elastic headband are adjustable for comfortable fit. And the Super-Tough* lenses meet or exceed Federal Specifications for optical clarity as well as impact resistance.

DAILY REMINDERS

Such as Willson "Blind Man" Safety Posters keep workers aware of the need for wearing goggles. Supplies available on request.

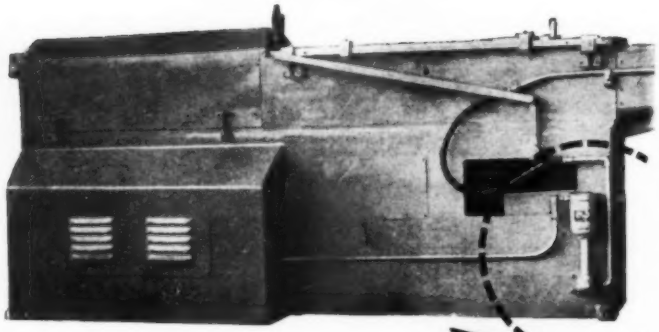
WILLSON®

"Established 1870"

*T. M. Reg. U. S. Pat. Office

WILLSON PRODUCTS, INC., 235 WASHINGTON STREET, READING, PENNA.

Here's why...
you get more production...



with a
RUTHMAN GUSHER COOLANT PUMP

Illustrated is an Acme H-4T-365 Horizontal Broaching Machine equipped with a Model 3-P3 1/10 HP Long Ruthman Gusher Coolant Pump.

Split-second high volume delivery of coolants from Gusher Pumps satisfies the requirements of copious coolant flow when you want it, where you want it.

Simple construction, oversized pre-lubricated ball bearings requiring no further lubrication, electronically balanced shaft assembly insures long trouble-free pump life with low maintenance costs.

So specify Ruthman Gusher Coolant Pumps on your machines for more production at lower cost.

Write us today for our new catalog.

THE RUTHMAN MACHINERY CO.

1818 READING ROAD **CINCINNATI, OHIO**

sometimes, than reduced costs. For example, there is the steady flow of production made possible through the application of time-and-motion studies to provide an even flow of parts and materials through the plant. There is the utilization of existing production space to better advantage; resulting from shortened production cycles, reduction of inventory of goods-in-process, and the change from stop-and-go to continuous-flow production. All of this is in addition to the better working conditions, greater safety, and other advantages which improve employee relations and attract a better class of labor."

•

Hoists Cut Absenteeism

THREE REASONS why cranes and hoists are purchased are, "(1) to speed production and effect low production costs, (2) safety, and (3) convenience," according to A. R. Walkley, general sales manager, Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc., in an address at the Materials Handling Conference in Philadelphia. The program was arranged by the Management and Materials Handling Division, ASME.

Pointing out that numerous studies have been made on the first point, Mr. Walkley turned his attention to points two and three.

"Believe it or not," he said, "in many instances where equipment produced by our industry has been purchased for the first of the above reasons, other advantages not expected at the time the purchase was made were found to be of equal importance.

"Typical of this is one installation of approximately 25 small electric hoists. They were purchased foremost for the purpose of speeding up operations and to effect cost reduction. The hoists did this. In addition, however, they also reduced absenteeism in the particular department in which they were installed approximately 25%. Reasons for this were that they reduced almost to elimination foot injuries and strains that had been prevalent in that particular group.

"We know of another similar installation, this time in a large shop with the principal idea being to assist in reducing absenteeism due to injuries. The loads handled were light in weight and, although studies revealed very little savings could be affected by electric hoists, relief obtained from absenteeism, as well as the indirect benefits derived there-

from in increased production, more than warranted the purchase of these hoists."

•

Hydraulic Problems

"A HYDRAULIC SYSTEM consists of *pressure*, *volume* and *direction* in a circuit. Hydraulic equipment should last for years if properly maintained, because it is self-lubricated and can be stalled without damage." M. A. Hayden of Vickers, Inc., speaking to the Detroit section of the ASLE, stated that hydraulic service problems are concerned with cleanliness, rigidity (to prevent distortion due to stress), close clearances and use of the correct oil. Service troubles can be broken down into four main causes—improper fluid, including the wrong oil, dirt and rust (70%), mechanical troubles (10%), overloading (10%), and improper diagnosis of troubles (10%).

Maintenance can be reduced if such parts as replaceable "pump cartridges," felt seals, filters to catch lint, covers on reservoirs, external oil coolers, moisture-controlling devices and hydraulic power packages outside the machines are employed.

The user can reduce maintenance by selecting the proper oil, filtering new oil, changing old oil and flushing the system at the same time, keeping operating temperatures within limits, using tight connections and having the systems checked by a serviceman who knows what he is doing.

NEW BOOKS

FBI REGISTER OF BRITISH MANUFACTURERS—*1948/9, 21st Edition. Published for the Federation of British Industries by Kelly's Directories Ltd. and Iliffe & Sons Ltd., Dorset House, Stamford St., London S.E.1, 752 pages. 42 shillings.*

Completely revised and greatly extended, this volume contains information on nearly 6000 British manufacturers and their products. It is the official Year Book and Directory of the Federation of British Industries, the largest organization of manufacturers in Great Britain.

The book contains sections listing member companies classified by products and services; member as

Get MAXIMUM PRODUCTION
from both men and machines with
TOWMOTOR MH*
*MH is MASS HANDLING—the systematic movement of the most units, in the shortest time, at the lowest cost.

With Towmotor Mass Handling, men and production machines operate at peak efficiency. Maximum production at lowest cost is the result. Towmotor Fork Lift Trucks and Tractors, gasoline powered for full-time, full-power service, offer you every advantage and benefit of modern lift truck operation. There is a size for every type of plant, small or large. Numerous accessories and attachments further increase the adaptability of Towmotor Mass Handling to your particular handling job. Get maximum production at minimum cost all the way down the line. Use *Towmotor*, the Fork Lift Truck preferred by professional handlers everywhere.

TOWMOTOR CORPORATION • Div. 56, 1226 East 152nd Street, Cleveland 10, Ohio
Representatives in all Principal Cities in U. S. and Canada

Redesign Your Plant Layout in Miniature
Determine in advance how you can use Towmotor Fork Lift Trucks to best advantage. Send today for
MINIATURE MODEL TOWMOTORS
actual scale ¼"=1' $1.00 each

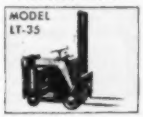
MODEL LT-35

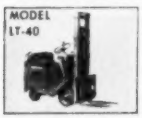
TOWMOTOR
THE ONE-MAN-GANG

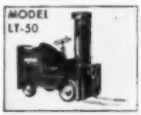
FORK LIFT TRUCKS and TRACTORS

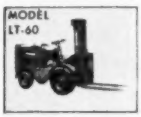
RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

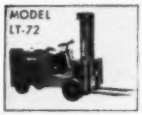
PARTIAL LIST OF TOWMOTOR MODELS

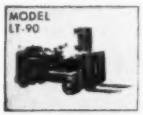

MODEL LT-35


MODEL LT-40


MODEL LT-50


MODEL LT-60


MODEL LT-72


MODEL LT-90

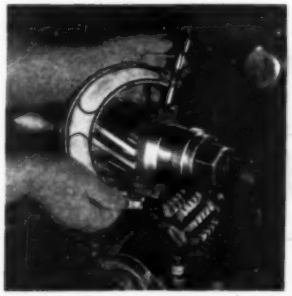
TRACTOR

Sculpture In Steel . . . Master Hohs—delicately detailed in HSC 422 alloy tool steel—preferred for its toughness and hardness—for its ability to retain shape, design, sharp delineation, under extreme pressures.

An unusual assortment of fine tool steels . . . in various sizes, shapes, finishes, conditions . . . available promptly from the conveniently located warehouses of Hoyland Steel Company. Complete technical assistance in solving tool steel problems. Hoyland Steel Catalog-Work Book available on request.

DISTRIBUTORS

HOYLAND STEEL COMPANY, INC. 405 Lexington Ave., New York 17, N.Y. • GRAMMER, DEMPSEY & HUDSON, Inc. 212 Rome Street, Newark 5, N. J. • ACHORN STEEL COMPANY, 381 Congress Street, Boston 10, Mass. • GREAT WESTERN STEEL CO. Inc. 1011 East 61 Street, Los Angeles 1, Cal.



MAKE YOUR BLUEPRINTS COME TRUE

. . . with Amgears co-ordinated engineering and manufacturing know-how

We have the designing engineers viewpoint on the importance of strict adherence to blueprints and specifications. The same personal care is given to the production of gears and gear assemblies in our plant that the designer gives to the engineering of the job.

Specifications are studied by our engineers to determine the most efficient economical manufacturing procedure. Sometimes modifications are suggested to achieve greater production economy, but when a contract is accepted the specifications are strictly followed in production.

★ *A qualified sales engineer representing Amgears, Inc., is located near you for personal service* ★ *We invite correspondence on your particular gear problems.*

★ *We specialize* . . . in all types of gears and gear assemblies for original equipment.

Gears for construction equipment.
Automotive and tractor gears.
Fine pitch instrument gears.
Gears for farm implements.
Special gears for high speed operation, with shaved or ground teeth.
Miter and bevel gears for mining machinery.
Spur or helical teeth pump gears.
Aircraft engine and airframe gears.

AMGEARS, INC. 6633 WEST 65TH STREET, CHICAGO 38, ILLINOIS PHONE — PORTSMOUTH 7-2100

AMGEARS, INC. CHICAGO

A SUBSIDIARY OF NUPP CORPORATION CONTRACT MANUFACTURERS Detroit • Cleveland • Chicago

sociations classified by industries; alphabetical directories of addresses of companies and associations; brands and trade names; and an illustrated section of trademarks.

Information on how to use the various sections is printed in English, French and Spanish.

NAMES IN THE NEWS

Barron D. Berger

Barron D. Berger has been appointed chief engineer of National Electric Welding Machines Co., Bay City, Mich. He was formerly assistant chief engineer in charge of special machine design at Federal Machine and Welder Co., Warren, Ohio.

Edward Norris has been elected chairman of the board of directors and W. V. Daugherty has been made president of Utica Drop Forge & Tool Corp., Utica, N. Y.

R. G. Neilson has been named general manager of production and manufacturing for Mackintosh-Hemphill Co., Pittsburgh and Midland, Pa.

J. H. Oakes has been appointed sales manager for enclosed drives, Link-Belt Co., with headquarters at the company's Philadelphia plant. He will be assisted by **Harry F. Kurz** as representative, enclosed drives, with headquarters at the Pershing Road plant, Chicago.

Vincent A. Schmidt, since 1940 production manager of Baker Bros., Inc., Toledo, has joined the Nelson Stud Welding Div. of Morton Gregory Corp., Lorain, Ohio.

Ralph G. Harmon has been named district manager of Timken Roller Bearing Co.'s Industrial and Steel and Tube Divisions in Birmingham, Ala. **M. S. Downes** has been appointed general sales manager of Timken's Railway Div., Canton, Ohio. **J. E. McCort** was named assistant general sales manager of the Railway Div.

John C. Wilson

John C. Wilson has been named director and vice president in charge of sales, Thompson Grinder Co., Springfield, Ohio. For the past ten years he has been designer, chief draftsman, chief engineer and sales manager with the company.

Bernard R. Better has been named director of research, Scully-Jones & Co., Chicago. He has been with the company since 1939, and has been responsible for development and standardization of many of its production tools.

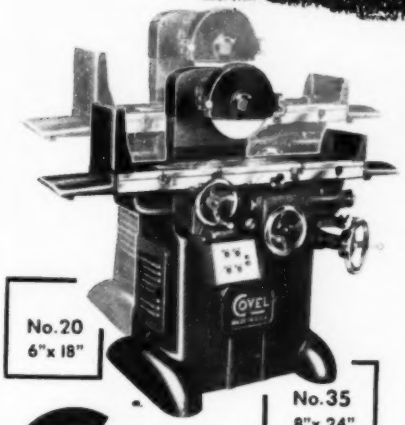
Leslie McArthur, vice president, has been elected a member of the board of directors of Niles-Bement-Pond Co., West Hartford, Conn. He first joined the Niles organization in 1947 as manager of the Chandler-Evans Div.

P. H. Cobbs has been named superintendent of the new automatic washer plant of The Maytag Co., Newton, Iowa. Wesley Bissett has been named manager of the new Maytag plant at Hampton, Iowa.

Edmond A. Neal

Edmond A. Neal has been appointed assistant director of sales, Nicholson File Co., Providence, R. I.

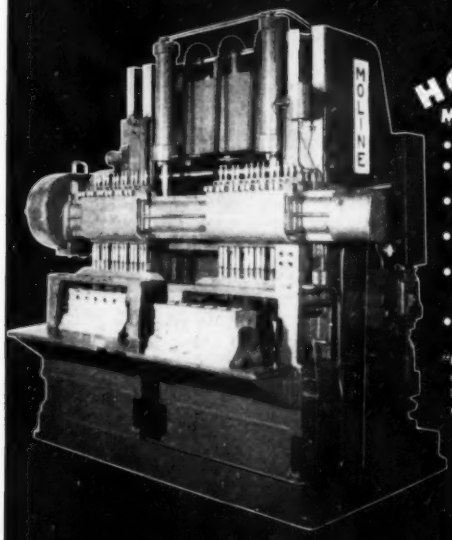
CUT GRINDING COSTS with the COVEL "TWINS"



Yes . . . you can cut production costs with either one of these precision high-speed surface grinders. The COVEL No. 20 has a 6" x 18" working surface with a 10" grinding wheel driven by a 1½ H.P. motor. The No. 35 features a working surface of 8" x 24" with a 12" grinding wheel and a 2 H.P. motor.
Each of these economical grinders have a hydraulically controlled table with travel speeds up to 90 f.p.m. Wet grinding attachment and built-in wheel dresser are also available. Write for free illustrated Bulletin A-69.

COVEL MFG. COMPANY
Our 75th Year
BENTON HARBOR, MICHIGAN

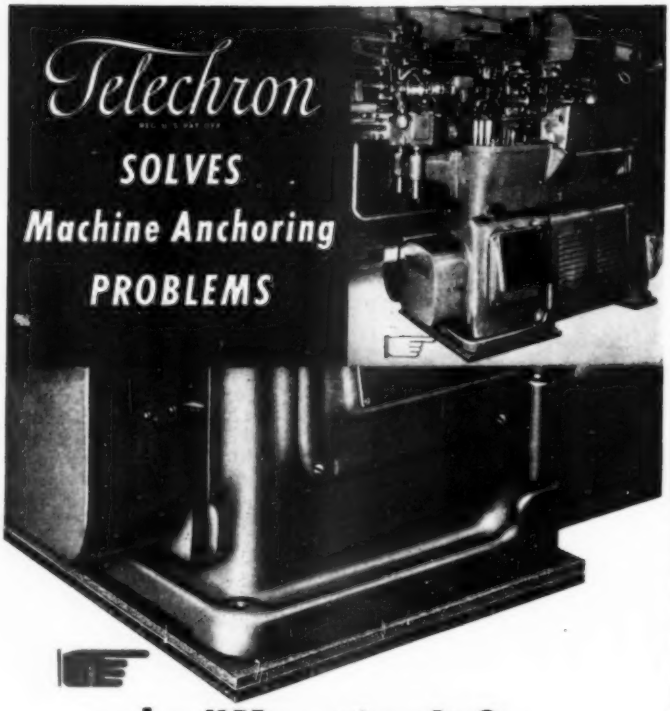
PRODUCTION UP...
COSTS DOWN
with...
HOLE-HOG
MACHINE TOOLS



- Multi-Spindle Boring
- Single and Multi-Spindle Honing
- Straight Line Multi-Drilling
- Adjustable Spindle Drilling
- Vertical and Way-Type Fixed Center Drilling, Boring and Tapping
- Special Multiple Operation Machine Tools

"Hole-Hog" does it better with 50 years of Machine Tool Engineering experience at your service.

MOLINE TOOL CO.
HOLE-HOG
MOLINE, ILLINOIS



by "Mounting It On

UNISORB"

This leading clock manufacturer cut installation time materially when UNISORB machine mounting came into the picture.

They cut transmitted machine vibration 60% to 85%.

They eliminated the need for old-fashioned, destructive floor-drilling in most instances—*because UNISORB requires no bolts or lag screws.*

Your company can do the same. Clip and mail coupon *today.*

The FELTERS Company

210-N SOUTH STREET, BOSTON 11, MASS.

Gentlemen:
Please send my free copy of "Why It Pays To Anchor Your Machines With UNISORB."

Name_____

Title_____

Company_____

Street_____

City_____

Makers of FELTS

in all colors, thicknesses, consistencies, qualities . . . for all purposes. Rolls, strips, sheets and precision cut felt parts.

A. F. Anjeskey

A. F. Anjeskey, sales manager of the Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., Wickliffe, Ohio, has been elected president of the Monorail Manufacturers' Assn., New York. **Wilbur Mayer,** sales manager of the Louden Machinery Co., Fairfield, Iowa, was elected vice president, and **E. Donald Tolles** was elected secretary-treasurer.

Arnold Kaiander has been elected president, Abdite Gauge Co., Dearborn, Mich. **Steven Coloske** and **Oliver Laszlo** have been elected vice presidents, and **Stanley Czarnik,** secretary and treasurer.

J. L. Feuchter has been appointed service engineer for the Ohio territory of The Federal Bearings Co., Inc., Poughkeepsie, N. Y.

Harry S. Hagan has been appointed manager of the Butler, Pa., freight car plant of Pullman-Standard Car Mfg. Co., Chicago.

Russell F. Stuart, for 13 years head of eastern U. S. sales activities for Kearney & Trecker Corp., Milwaukee, has been appointed sales manager for the company's Walker-Turner Div., Plainfield, N. J.

Orrin B. Werntz has been appointed managing director and counsel of Pressed Metal Institute, Cleveland. For the past 11 years executive secretary of the National Screw Machine Products Assn. of Cleveland, he will continue his duties in that capacity in addition to his work with Pressed Metal Institute. **Jerry Singleton** has been named assistant manager of PMI.

William A. Schaub has been named manager of the Denver district, and **Raymond P. Russel** manager of the Boston district, of the Industrial Products Sales dept. of B. F. Goodrich Co., Akron, Ohio.

Kendrick H. Lippitt has been appointed chief engineer of Technical Appliance Corp., Sherburne, N. Y.

Harvey Kent has been appointed division superintendent in charge of Boeing Airplane Co. production work at its Renton, Wash., plant.

A. H. Rude has been named executive vice president of Aerojet Engineering Corp., Azusa, Calif., and managing director of General Tire & Rubber Co.'s West Coast operations.

Frank T. Sisco, director of alloys of iron research, has been appointed technical director of the Engineering Foundation, New York.

BUSINESS ITEMS

The Pearce Development Co., Cleveland, a former subsidiary of Standard Envelope Mfg. Co., has been incorporated by Milton P. Altschul, vice president and secretary of Standard Envelope. The firm specializes in the design and development of special machines for paper converting.

The Hickok Mfg. Co., Rochester, N. Y., marked its 40th anniversary on March 10 with a 150-mile day-long bus tour of its four newly consolidated and reorganized plants in Rochester, Mount Morris and Lyons, N. Y.

Morrison Railway Supply Corp., Buffalo, N. Y., has opened a factory in Birmingham, Ala., to manufacture tanks for gasoline and fuel oil storage. The company will specialize in skid and storage tanks up to 1000 gallons.

Kennametal, Inc., Latrobe, Pa., has moved its New York office to 11 West 42nd St., New York.

Kwikset Locks, Inc., is the new name for Gate-Way, Inc., Anaheim, Calif.

J. K. Smit & Sons, Inc., has transferred its home office and complete manufacturing facilities from New York to a new location in Murray Hill, N. J.

Reltool Corp., Milwaukee, is moving its main office from 712 W. Michigan St. to 4540 W. Burnham St., the site of a new plant.

OBITUARIES

Winfred W. Elliott, founder of The Elliott Mfg. Co., Binghamton, N. Y., died on Jan. 26. Active in the flexible shaft industry since 1898, he was a partner in the Binghamton Flexible Shaft Co. from 1920 to 1931 when he sold out to establish the present company in 1932.

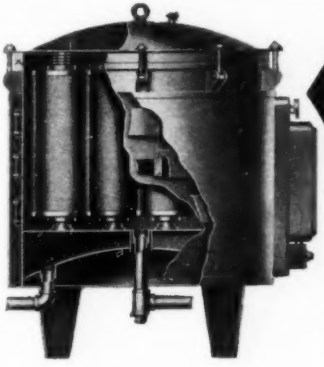
Paul Fielden, 62, director of purchases of Norton Co., Worcester, Mass., and former president of the National Assn. of Credit Men, died Feb. 6 in Worcester. He was with Norton Co. for almost 30 years.

A HEAD with exclusive advantages

for heat savings—for faster, easier cartridge changes

THE HOFFMAN CARTRIDGE FILTER

A new high in modern efficient design has been achieved in the Hoffman Cartridge Filter line. Swing bolts simplify and speed up head removal. Exclusive head-lifting device assures quick, easy access for cartridge replacements. Domed head construction and thick insulation reduce heat loss — save fuel. Today's need for more dependable, effective filtering of hydraulic and lubricating oils is strong reason for further investigation of the full details on Hoffman Cartridge Filters. Write today for literature.



FOR 7 x 18 (NAVY) AND 11 x 18 CARTRIDGES

Navy-size (7 x 18) throw-away cartridges are used in one series of Hoffman cartridge filters. Multiples of 1, 2, 4, 7, 9 and 18 cartridges. Another series uses 11 x 18 cartridges, either repackable or throw-away type, in multiples of 1, 2, 3, 4, 6 and 8. Available with or without heaters and controls, to meet service requirements. Filter material can be fullers earth, cellulose or waste.

Write NOW for bulletins A-649 and A-703

FILTRATION DIVISION

U.S. HOFFMAN MACHINERY CORPORATION

211 LAMSON STREET, SYRACUSE 6, N. Y.

CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.

CROSS UNIVERSAL GEAR MACHINES

for

- ROUNDING
- CHAMFERING
- POINTING
- BURRING

Cross Universal Gear Machines embody advanced engineering developments to obtain highest productivity and assure lowest possible operating costs.

They feature utmost flexibility for handling a wide variety of gears. Continuous cutting motion, exclusive with Cross, speeds production at top efficiency.

Special skill is not required because machines are automatic and push button controlled. Power clamping is foot pedal controlled. Both hands are free for work handling.

No. 55

For rounding, pointing, chamfering or burring external and internal:

spur gears
helical gears
clutches
splines

Typical productivity when rounding or pointing 8 pitch 30 tooth gears is 55 net hourly.

No. 65

For pointing or chamfering external and internal:

clutches
spur gears
bevel gears
splines

Typical productivity when pointing 10 pitch 30 tooth gears is 100 net hourly.

No. 75

For burring or chamfering both ends at the same time.

helical gears
spiral bevel pinions
hypoid pinions

Typical productivity when chamfering 8 pitch 40 tooth gears is 200 net hourly.

THE **CROSS** COMPANY
Established 1898

SPECIAL MACHINE TOOLS
MILLING • DRILLING • TAPPING • BORING
TURNING • SHAPING • GRINDING • HONING

DETROIT 7 MICHIGAN

Alvin B. Einig

Harry G. Leighton

Alvin B. Einig, 64, general manager and director of Motch & Merryweather Machinery Co., Cleveland, and widely known throughout the machine tool industry, died in Charity Hospital, Cleveland, Feb. 27 after an illness of several months. He became assistant chief of the Tools Div. of the National Defense Advisory Commission in June 1940 and later held the same position with the War Production Board. During World War I he was stationed in Washington as assistant to the late George Merryweather who headed machine tool procurement. He was a member of American Society of Mechanical Engineers, Army Ordnance Assn., Society of American Military Engineers, and in 1945 and 1946 was president of the American Machine Tool Distributors Assn.

Harry G. Leighton, former manager of the Philadelphia office of Brown & Sharpe Mfg. Co., Providence, R. I., died suddenly in Mt. Airy, Philadelphia, Pa., Jan. 18. He retired from his position as manager of the Philadelphia office Dec. 31, 1946, after more than 40 years with the company.

Use

ALOX

for Metal Cutting

for Lubrication

for Prevention of Rust

In place of animal fats and vegetable oils to save cost and provide stability in metal cutting lubricants, greases, and steam engine oils, etc.

In the preparation of preservative lubricants for the shipment of engines and replacement parts.

In the preparation of automotive, diesel and industrial oils of enhanced lubricity and detergency.

In the preparation of film-forming rust preventives, which will guarantee the safe arrival of overseas shipments of metal goods.

Write for samples and compounding instructions.

Write directly attention RESEARCH DIRECTOR

ALOX CORPORATION
3024 BUFFALO AVENUE
NIAGARA FALLS, NEW YORK

FREE LITERATURE

New Catalogs, Booklets, Bulletins

MACHINERY AND ATTACHMENTS

1 LATHES—*South Bend Lathe Works, South Bend, Ind.* 28-page catalog 77-U specifies attachments for lathes and drill-presses such as collets, slides, turrets, holders and dogs. Prices are supplied with specifications.

2 TURRET LATHE—*G. M. Diehl Machine Works, Wabash, Ind.* 6-page folder presents No. 2 turret lathe with photograph and drawings, as well as descriptions and specifications.

3 PRESSES—*New Albany Machine Mfg. Co., New Albany, Ind.* 4-page bulletin No. 7 features series "A" inclinable punch presses and includes specifications of presses with capacities from 14 to 88 tons.

4 MACHINE TOOLS — *National Machine Tool Builders' Association, Cleveland 6, Ohio.* 24-page booklet, "Machine Tools Today," has basic information on the five fundamental machine tools, including discussions of theory, illustrations of applications, and tips on selling machine tools.

5 AUTOMATIC LATHE — *Monarch Machine Tool Co., Sidney, Ohio.* 32-page booklet No. 1804 features Mona-Matic machine for single-point metal turning. Photos, tooling drawings and views of the lathe are included.

6 BROACHES—*Colonial Broach Co., Harper Station, Detroit 13, Mich.* Bulletin No. RT-48 describes dual-ram surface broaching machine with dimensional drawings, data tables, accessory lists and specifications.

7 HYDRAULIC PRESSES — *Denison Engineering Co., Columbus, Ohio.* External house organ features stories on hydraulic-press applications.

8 DRILLS—*National Automatic Tool Co., Richmond, Ind.* 20-page bulletin 848 describes Holesteel Model C floor-type units with single spindles, fixed- and adjustable-spindle, multi-spindles. Examples of work done are presented with drawings and data.

9 MILLING MACHINE — *Sundstrand Machine Tool Co., Rockford, Ill.* 6-page folder depicts contour milling machine for both external and internal contours on parts up to a 5-in. diameter.

10 USED MACHINE TOOLS—*Emerman Machinery Corp., Chicago 43, Ill.* 24-page Red Book lists second-hand lathes, mills, drills and grinders of many brands in good condition.

11 AUTOMATIC BAR MACHINE—*Cone Automatic Machine Co., Windsor, Vt.* Buyer's comparison chart for multiple-spindle automatic bar machines permits comparison of features, performance and capacities of any bar machines.

12 TAPPERS — *Snow Manufacturing Co., Bellwood, Ill.* 4-page chart contains information on percent of thread for tapping based on standard drill sizes. Tapping heads and drill are illustrated.

13 DIE CASTING MACHINES — *Miller-Taylor Tool Co., Cleveland 3, Ohio.* 20-page booklet presents information, illustrations and specifications on die-casting machines for lead, zinc, tin, light metals and other metals in small, medium and large sizes.

14 JIG BORERS—*Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn.* 32-page booklet illustrates jig-boring machines, attachments and accessories, and presents a typical job and its solution.

15 BROACHING MACHINES—*American Broach and Machine Co., Ann Arbor, Mich.* 12-page circular No. 400 has information on vertical pull-up internal broaching machines with manual or automatic loading devices.

16 ENGINE LATHES—*Sidney Machine Tool Co., Sidney, Ohio.* 8-page folder depicts 18-in. engine lathe with 32 speeds. Gearbox drawing and specifications are included.

17 PRESS BRAKES—*Cyril Bath Co., Cleveland 8, Ohio.* 40-page catalog presents Sturdybender universal brake with photographs, information on the company, and detailed discussions of features.

TOOLS AND ACCESSORIES

18 TOOLHEAD—*Chandler Tool Co., Muncie, Ind.* 6-page bulletin presents combined boring and facing toolheads in six sizes and models, with boring bars to match. Photographs, specifications, and prices are all included.

19 FILES—*Nicholson File Co., Providence 1, R. I.* 12-page bulletin contains practical information on when, how and why to use special files for aluminum, babbitt, brass, bronze, copper, magnesium, and other specialized work.

20 LUBRICATION—*Bijur Lubricating Corp., Long Island City 1, N. Y.* 24-page bulletin 4-C shows application of small oiling systems to small machines and isolated units of large machines. The system has been used on such machines as zipper machines and radar equipment.

21 CONTROL VALVES — *Bayless-Kerr Co., Cleveland 15, Ohio.* Four, 4-page folders cover equipment for industrial-oil hydraulic-control systems with capacities from 5 to 64 gal. per min. Systems can control single or double-acting hydraulic cylinders.

22 PNEUMATIC TOOLS—*Keller Tool Co., Grand Haven, Mich.* 48-page catalog No. 14 illustraltes and gives specifications on rotary tools, vertical piston tools, grinders and sanders, chippers, rivets, riveters and reamers, compression riveters, air hoists, and accessories.

23 TESTING MACHINES — *Tinius Olsen Testing Machine Co., Willow Grove, Pa.* Bulletin No. 36 features testing machines for plastic materials. Tests can be conducted on flow, torsion, load deformation, stiffness, torsion-stiffness, impact, heat distortion, creep and brittleness. Testing accessories are also included.

24 JIG BORER TOOLS—*Moore Special Tool Co., Bridgeport, Conn.* 20-page cutting tool guide promotes standard jig boring procedure by suggesting cutting tools, breaking down time estimates, and tabulating feeds and speeds.

Example

Name John Roderick
Title Supt.
Company W.C. Dow Mfg. Co.
Co. Address 601 North St.
Brooklyn, 7, N.Y.
AMERICAN MACHINIST, New York

Fill in below number of ONE catalog wanted: (32)

How to Order

1. If you are requesting four pieces or less, please use only the bottom card.
2. Be sure to fill one space for each booklet.
3. When you have filled out one card, detach stamp and mail.

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York

FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )

Not good after June 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )
Not good after June 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )
Not good after June 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )
Not good after June 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )
Not good after June 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )
Not good after June 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )
Not good after June 1, 1949

Name .....
Title .....
Company .....
Co. Address .....
.....
AMERICAN MACHINIST, New York
FILL IN BELOW NUMBER OF ONE CATALOG WANTED: ( )
Not good after June 1, 1949

FREE LITERATURE

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place 3¢ Stamp Here

AMERICAN MACHINIST
330 West 42nd Street
New York 18, N.Y.

Place 3¢ Stamp Here

25 CUTTER GRINDING—*Cincinnati Milling and Grinding Machines, Inc., Cincinnati 9, Ohio.* 16-page booklet "Look Sharp at Your Cutters" contains tables, drawings and charts without descriptive text on the subject of cutter grinding. It is intended for use by an experienced man.

26 INSTRUMENTS—*Leeds & Northrup Co., Philadelphia, Pa.* 42-page catalog presents Speedomax Type G instruments for measurement and control. Instruments are for measuring both by hand and automatically and are classified by the speed necessary for recording or measuring.

27 TAP DRILL CHART—*South Bend Lathe Works, South Bend 22, Ind.* 13x19 in. wall chart with white lettering on a dark blue field shows tap drill sizes with decimal equivalent of drill.

28 SPRAY-PAINTING EQUIPMENT —*Binks Mfg. Co., Chicago 12, Ill.* 124-page catalog No. 954 and price list includes information on spray guns, flow guns, car-washing guns, nozzles, oil and water extractors, respirators, connections, pressure tanks, complete spraying units, compressor units, spray booths and spraying turntables.

29 SCREW-MACHINE TOOLS — *Boyar-Schultz Corp., Chicago 12, Ill.* 24-page booklet presents turning, burnishing, drilling, reaming, knurling, tapping, and cutting tools with holders. These are for installation in turrets.

HEAT TREATING AND WELDING

30 GAS APPLIANCES—*Johnson Gas Appliance Co., Cedar Rapids, Iowa.* 24-page catalog including price list illustrates furnaces and blowers with necessary attachments. Furnaces are for heat-treating, hot hardening melting and drawing metals.

31 INDUSTRIAL FURNACES—*Surface Combustion Corp., Toledo 1, Ohio.* 8-page folder describes a line of Standard-Rated Industrial Furnaces and equipment for all heat-treating operations.

PLANT SERVICE EQUIPMENT

32 UNIT HEATERS — *Ilg Electric Ventilating Co., Chicago, Ill.* Catalog No. 348 discusses application of unit heaters with illustrations and describes method of estimating heating requirements. Engineering data including steam pipe size tables, piping diagrams, motor and control wiring diagrams, and typical specifications are included.

33 AIR COMPRESSORS — *Worthington Pump and Machinery Corp. Harrison, N. J.* Four-page bulletin L-64-B2 is a compressor-selection chart based on normal applications handling air with atmospheric intake pressure. The chart compares discharge pressure and piston displacement and recommends compressor bore and stroke.

34 OVERHEAD HANDLING EQUIPMENT—*Abel-Howe Co., Chicago 4, Ill.* 12-page catalog illustrates cranes, jibs, monorails, and accessories for low-cost overhead handling.

35 STORAGE BATTERIES — *Gould Storage Battery Corp., Trenton, N. J.* 40-page pocket handbook presents instructions and engineering data on the care of motor-power batteries. Detailed exploded views of tape-insulated and mat-insulated batteries are included.

36 SPRAY BOOTHS—*Schmieg Industries, Inc., Detroit, Mich.* 32-page catalog 481 shows installations of spray baths, mechanical washers, industrial ovens, dust and fume-control equipment and other sheetmetal equipment. Tables of engineering information include data on area and circumference, weight of pipe, and water discharge through orifices.

37 TRUCK DRIVE—*Clark Equipment Co., Battle Creek, Mich.* 10-page booklet in color presents Dynatork Drive for forked lift trucks with illustrations; phantom views and descriptions of the new drive are included.

38 CRANES—*Whiting Corp., Harvey, Ill.* 16-page bulletin M-11 presents Trambeam low-cost overhead materials handling system, which consists of open rails suspended by flexible connectors to the supporting structure. Descriptions cover fittings, carriers, electrification, assemblies, drives, and cranes.

39 BLOWERS — *Roots-Connersville Blower Corp., Connersville, Ind.* 18-page bulletin describes rotary positive blowers and includes operating characteristics, illustrations, and examples of various applications.

40 TANK VENTILATION—*DeBothezat Fans Div., American Machine and Metals, Inc., East Moline, Ill.* 36-page bulletin gives design data for lateral tank ventilation and includes sketches, solutions of design problems, and pressure-volume charts.

41 SKIDS—*Barrett-Cravens Co., Chicago 9, Ill.* 32-page bulletin depicts steel-leg skids and boxes for materials handling.

42 LIGHTING — *Adjustable Fixture Co., Milwaukee 2, Wis.* 13-page catalog No. 65B shows advantages of Ajusco machine- and bench-lighting brackets for spotlighting work places.

PARTS AND MATERIALS

43 FINISHED METAL — *American Nickeloid Co., Peru, Ill.* Metals sampler contains 12 pieces of finished stock with various finishes illustrated, including chromes, coppers, nickels, and brasses.

44 LEATHER PACKINGS — *Chicago Rawhide Mfg. Co., Chicago 22, Ill.* 50-page booklet shows design and application of mechanical leather packings with many illustrations and descriptive literature.

45 DROP FORGINGS—*Drop Forging Association, Cleveland 15, Ohio.* 60-page reference data booklet "Metal Quality" describes and illustrates the development of metal quality progressively throughout hot working operations from the blast furnace to the finished forging for forging users.

46 DECAL NAMEPLATES — *Meyercord Co., Chicago 44, Ill.* 16-page booklet in color discusses product markings and illustrates samples of decals. A slide-rule decal selector is available.

47 ALUMINUM CASTINGS — *Aluminum Industries, Inc., Cincinnati 25, Ohio.* 80-page reference manual "Permite Aluminum Alloy Castings—Their Production and Application," covers all phases of production characteristics and uses of aluminum castings as produced by sand, permanent-mold, semi-permanent mold, and die-casting processes.

48 WIRE ROPE—*Jones & Laughlin Steel Corp., Pittsburgh 30, Pa.* 96-page pocket handbook illustrated with cartoons gives men on the job explanation of how wire rope works, how it should be operated, and how to select and order correct wire-rope construction.

49 STEEL—*Inland Steel Co., Chicago 3, Ill.* 64-page booklet "How Steel Is Made" presents story of modern steel-making from mines to finished steel. Book includes sketches, diagrams, and photographs.

50 TENITE—*Tennessee Eastman Corporation, Kingsport, Tenn.* 42-page booklet "Tenite Specifications" contains tables of physical properties of Tenite in various formulas and flows. Test results on Tenite I and II are set forth with adjusted values for tensile strength and flexural strength.

51 STEEL PLATE—*W. J. Holliday & Co., Hammond, Ind.* 32-page booklet on speed-case and speed-treat plate and 6-page booklet on speed-treat flats present data and photographs of the steels and applications.

52 PRINTED TAPE—*Topflight Tape Co., Div. Topflight Tool Co. Inc., York, Pa.* "Topflight Topics," Vol. 1, No. 1 is first issue of 8-page publication discussing applications of printed, pressure-sensitive tape.

BAUSH Cam-Hydraulic-Electric...

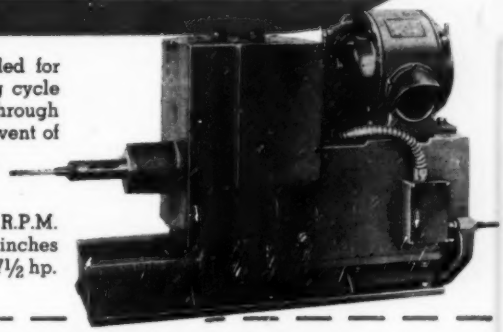
POWER UNITS!

Self-Contained—Dependable—Efficient

These Baush Power Units are adaptable for drilling, reaming, countersinking, boring or counter boring, and the No. 5 Electric Unit is also adaptable for tapping.

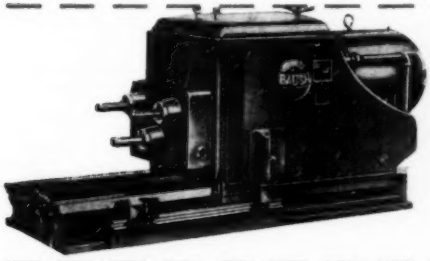
Designed for utility in different constructions, such as Vertical, Horizontal or Angular installations, these Units are built for rugged and continuous production.

A phone call — wire or letter will bring you complete engineering data.



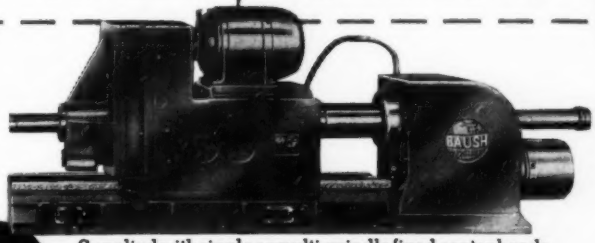
BAUSH CAM FEED POWER UNIT . . . Unexcelled for simplicity on production work. Complete operating cycle controlled by one revolution of cylinder cam through limit switch. Overload clutch prevents damage in event of tool breakage. Fixed center multi-spindle head can be attached to flange mounting. Desired tool speed secured by interchanging pick-off gears.

Spindle Speeds: . . . . . 150 to 1250 R.P.M.
Stroke: . . . . . Model #1—6 inches: Model #2—8 inches
Motor: . . Model #1—Up to 3 hp: Model #2—up to 7½ hp.



BAUSH HYDRAULIC FEED POWER UNIT . . .
Has self-contained hydraulic system — hardened and ground steel ways — large flange for mounting drill heads.
Spindle speeds easily changed by pick-off gears.
Rapid traverse — dwell or jump feed obtainable if desired.
Spindle Speeds: . . . . . 170 to 930 R.P.M.
Variable Feed Rates From ½" to 20" /min.
Stroke: . . . . . 12" Standard, 18" or 24"
Motor: . Model #20—up to 7½ hp: Model #30—up to 15 hp.

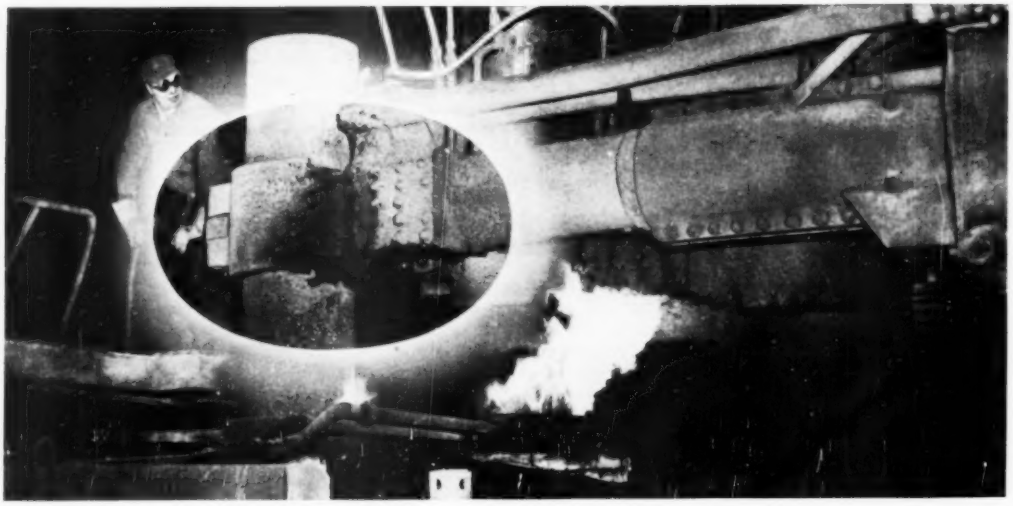
BAUSH #5 ELECTRIC LEAD SCREW POWER UNIT . . .
This Unit is of center feed construction insuring more accurate drilled holes and is readily adapted for boring and facing as well as tapping.



Supplied with single or multi-spindle fixed center heads, these units incorporate many outstanding features:
Traverse speeds of 120" — 150" per min. through 2 hp disc brake rapid traverse motor.
Spindle Speeds of 145 — 1650 R.P.M.
Feed Rates easily controlled through pick-off gears.
Spindle drive motors can be furnished in either 3, 5 or 7½ hp. Stroke: From 12" up to 30" as required.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS

How Tough Can a *High Conductivity* Casting Be?



MALLORY 3* METAL
Can Give You The Answer!

When you need *outstanding* physical properties in a casting for high conductivity applications, *Mallory 3 is your answer.* Special heat treatment gives Mallory 3 physical properties superior to those normally encountered in cast brasses and bronzes for high conductivity applications.

Mallory 3 is one of a series of special alloys developed by Mallory to meet industry's demand for materials with special physical properties, and it is available in cast form. Mallory engineers will advise you on your particular problem. Just let us know the physical requirements of your application.

Special Metallurgical Products

P. R. MALLORY & CO. Inc.
MALLORY
P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

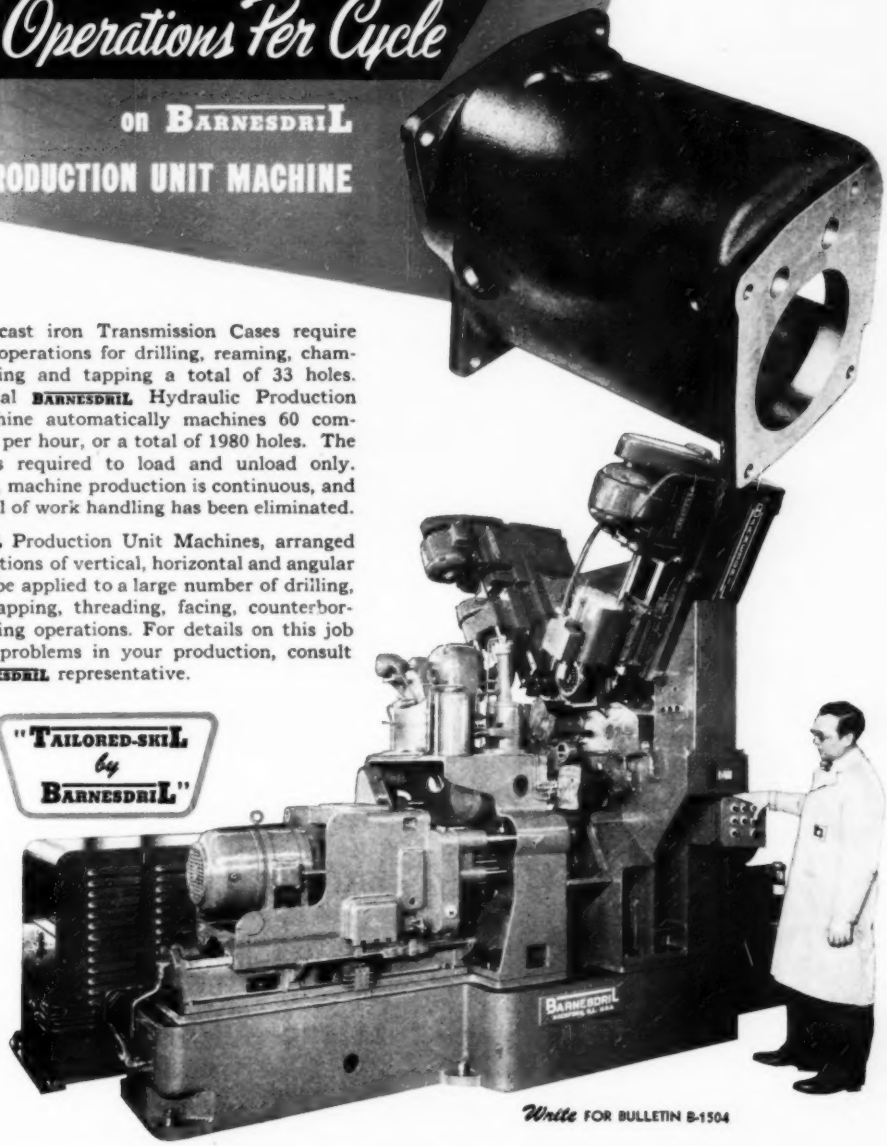
SERVING INDUSTRY WITH

Capacitors — Rectifiers
Contacts — Switches
Controls — Vibrators
Power Supplies
Resistance Welding Materials

*Reg. U. S. Pat. Off.

1980 Holes Per Hour
17 Operations Per Cycle

on BARNESDRIL PRODUCTION UNIT MACHINE



These cast iron Transmission Cases require seventeen operations for drilling, reaming, chamfering, facing and tapping a total of 33 holes. This special BARNESDRIL Hydraulic Production Unit Machine automatically machines 60 complete cases per hour, or a total of 1980 holes. The operator is required to load and unload only. As a result, machine production is continuous, and a great deal of work handling has been eliminated.

BARNESDRIL Production Unit Machines, arranged in combinations of vertical, horizontal and angular units, can be applied to a large number of drilling, reaming, tapping, threading, facing, counterboring or milling operations. For details on this job or similar problems in your production, consult your BARNESDRIL representative.

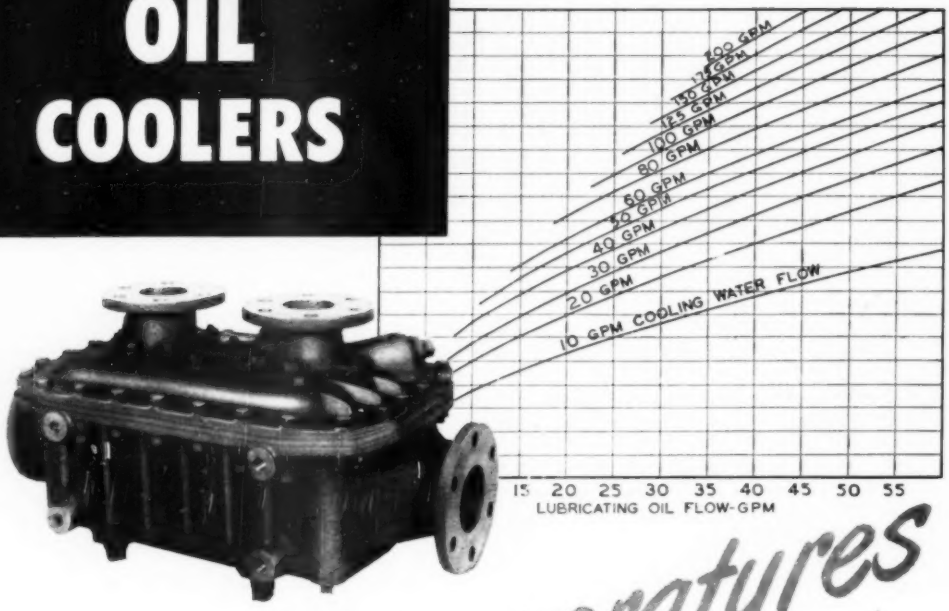
"TAILORED-SKIL by BARNESDRIL"

Write FOR BULLETIN B-1504

BARNES DRILL CO.

830 CHESTNUT STREET ROCKFORD, ILLINOIS U.S.A.

HARRISON OIL COOLERS



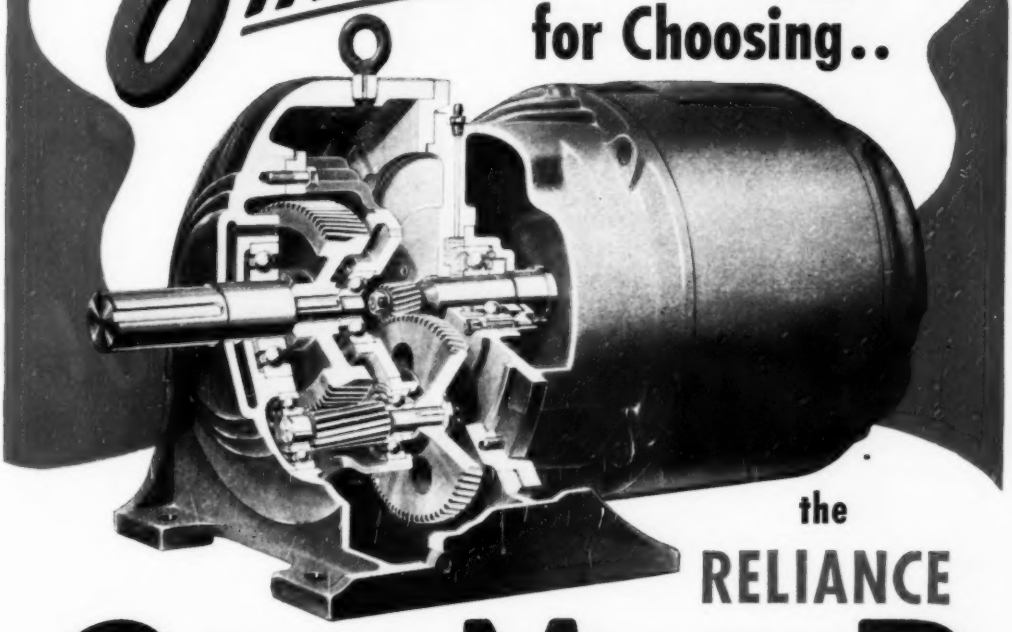
Control Temperatures TO DO 3 JOBS FOR YOU

1. **Increase Machine Productivity**
2. **Reduce Machine Maintenance**
3. **Extend Machine Life**

HARRISON

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORPORATION, LOCKPORT, N. Y.

6 INSIDE REASONS for Choosing..



the RELIANCE

GEARMOTOR

1 Helical, wear-hardened gears cut from alloy steel forgings and shaved before hardening for correct eccentricity and helical angle and bright, smooth surfaces—factors contributing to quiet operation and longer life.

2 Gear arrangement in simple train minimizes number of moving parts—promotes quietness.

3 Pinion and gear supported and spaced to reduce deflection—permits high load-carrying capacity.

4 Splash system with large oil reservoir assures constant and thorough lubrication of all parts.

5 Anti-friction bearing construction throughout.

6 Reliance *Precision-Built* Motors provide the maximum in dependable and economical power. Types that may be had with GearMotoR are described in GearMotoR Bulletin C-404. Ask also for bulletins describing Reliance *Precision-Built* A-c. Motors—engineered for every power requirement.

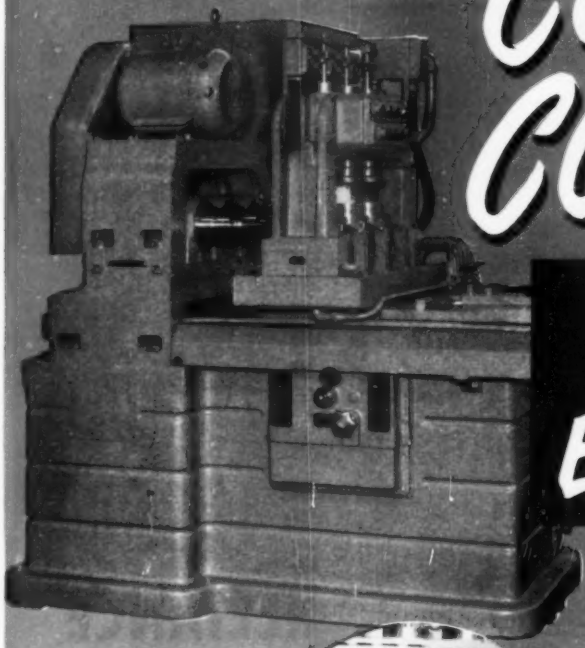
Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

1075 IVANHOE ROAD • CLEVELAND 10, OHIO

"Motor-Drive Is More Than Power"

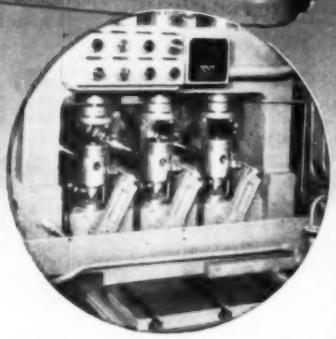
WANT TO CUT COSTS?



SEE EX-CELL-O!

For Example:

Ex-Cell-O Standard Machine with High Production Fixture—Bores Piston Wrist Pin Holes with .0003" Tolerance at Net Rate of 211 Pieces per Hour!



To right: Fixture on Ex-Cell-O 112-C Precision Boring Machine provides hydraulic locating and clamping. Operation is tied in with machine cycle. The addition of two interchangeable sets of lower work centers and locating pins adapts the fixture for the whole group of pistons.

The Precision Boring Machine shown to left above (Ex-Cell-O Style 112-C) bores piston wrist pin holes at a rate of 211 pieces per hour, holding a tolerance of .0003" on the bore diameter, and providing a fine surface finish. The high production fixture accommodates a wide variety of similar pistons. Ex-Cell-O machines like this are also widely used for precision turning, facing and grooving operations. If your production involves parts like this, call your local Ex-Cell-O representative, or write Ex-Cell-O in Detroit today!

EX-CELL-O CORPORATION

40-9

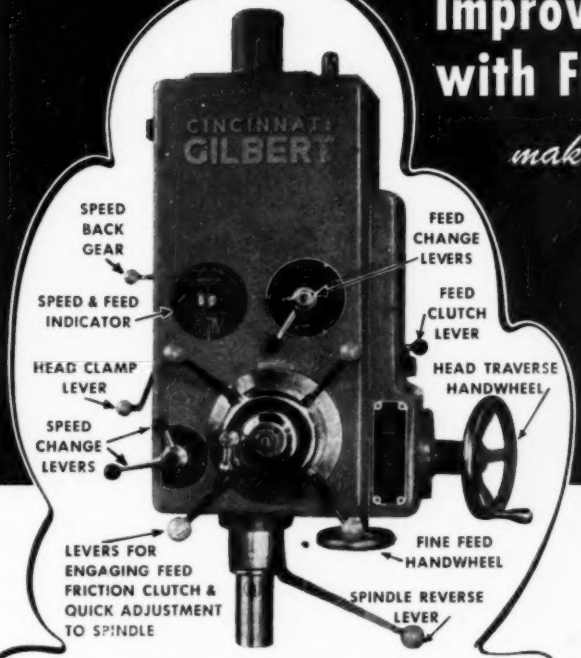
DETROIT 32, MICHIGAN

Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

Improved Head Design with Finger Tip Control

makes for easier operation

GILBERT MULTI-DUTY RADIALS

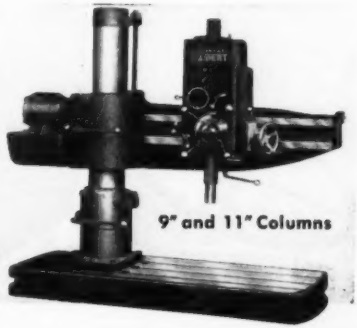


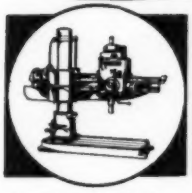
TWO FINGERS WILL SHIFT ANY LEVER

- *Speed Change Levers* control 12 speeds and direct reading plate simplifies speed selection.
- *Feed Change Levers* provide 6 feed changes, accurately by means of direct reading plate.
- *Speed and Feed Indicator* simplifies choice of proper speeds and feeds.
- *Head Clamp Lever* quickly binds head to arm
- *Levers for Engaging Spindle Power Feed*, a forward pull on any of the turnstile levers engages friction clutch.
- *Spindle Friction Clutch Lever* used to reverse spindle on *tapping operations.*
- *Feed Handwheel* provides fine hand feed to spindle.
- *Head Traverse Handwheel* for hand traversing head along arm.
- *Feed Clutch Lever* for engaging spindle feed knockout *clutch.*

● Every improvement in the design of this new head was made to simplify operation of the machine — to save operator's time — to help him get greater production with less effort. All of which adds up to lower costs — on your radial drill output.

Bulletin available

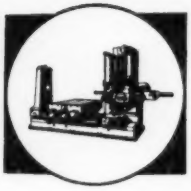




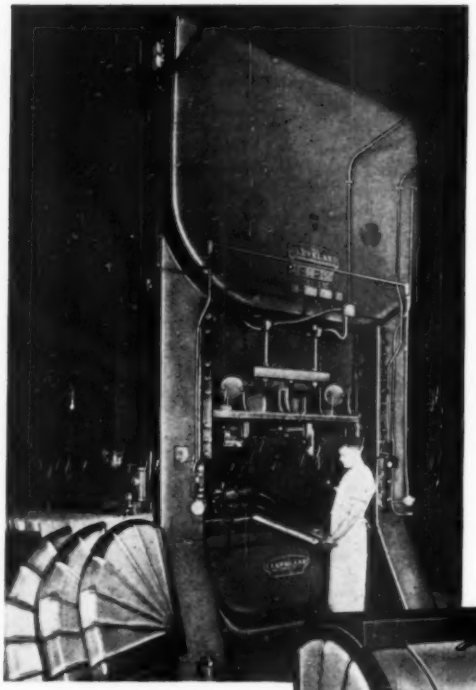
THE CINCINNATI GILBERT MACHINE TOOL CO.

3360 BEEKMAN ST. • CINCINNATI 23, OHIO

RADIAL DRILLS . . . . HORIZONTAL BORING MILLS



A CLEVELAND STORY



CLEVELAND TWO-POINT PRESSES
Stroke 16"; Adjustment 5"; Shut-height 24"; Bed-Area 38" x 60"; Strokes per minute 16; Capacity 250 tons.

In keeping with their "policy of progress" The Viking Air Conditioning Corporation has developed the modern streamlined Viking-Blower-Package shown below. This Blower has already found wide acceptance. Efficiency, serviceability and smart appearance were soon recognized. Like so many other nationally known manufacturers, Viking has, after careful investigation, installed a number of MODERN CLEVELAND PRESSES. The adaptability of these Presses, to various types and sizes of dies, has enabled Viking to produce a wide variety of stampings at the lowest possible cost.

We are proud that CLEVELAND PRESSES have helped The Viking Corporation to achieve these worthwhile results. When you expand or replace your present Power Presses we believe that you, too, will find it advantageous to install MODERN CLEVELAND PRESSES, designed to assure long life, dependability, accuracy and profitable production.

For complete information on the new CLEVELAND DRUM TYPE FRICTION CLUTCH and BRAKE, which offers greater economy and efficiency for all presses, write for Bulletin 34.

THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

PUNCHING TOOLS & DIES

OFFICES AT NEW YORK . . . CHICAGO DETROIT . . . . PHILADELPHIA PITTSBURGH

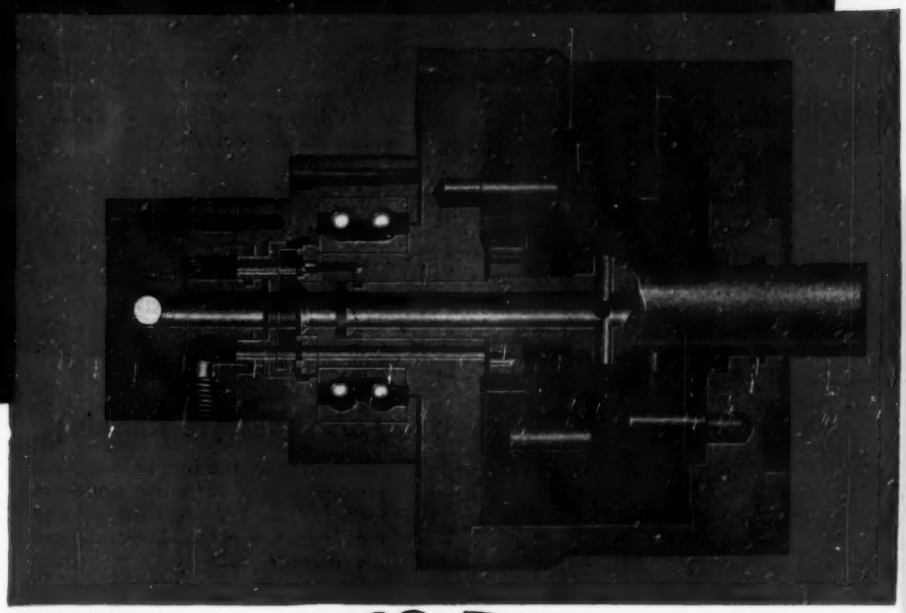
Established 1880

• • • • • • POWER PRESSES • • • • • •

FABRICATING TOOLS

CLEVELAND 14, OHIO

AN IMPORTANT ADVANCE
TO MEET TODAY'S DEMAND
FOR SPEED IN MACHINING



THE CUSHMAN HIGH SPEED *Aluminum* AIR CYLINDERS

FOR POWER CHUCK OPERATION

Especially developed for advanced machine tool applications . . . guaranteed to operate without pressure loss under heaviest recommended loads and at speeds to 5000 r.p.m.

Aluminum alloy forged cylinder bodies finished with lapped bores . . . cylinders statically balanced after assembly, no vibration, low flywheel effect.

Available for use with Cushman or other chucks in 3¼" to 12" sizes. Send for Bulletin.

CUSHMAN also manufactures
a complete series of
WRENCH OPERATED CHUCKS
Write for Catalog 63 and Bulletins

THE CUSHMAN CHUCK COMPANY, HARTFORD 2, CONN.

Here's how Bonderizing may CUT YOUR Metal Polishing COSTS

Are you looking for a way to cut high metal polishing costs on formed or drawn products? This may be the answer:

Bonderize the steel before forming or drawing

Frequent line stoppages to dress dies contribute to high unit costs. Scratches in production pieces require costly finishing.

With Bonderizing to protect the metal surface, the need for slow, expensive hand polishing to remove scratches is minimized. Sharply reduced, too, is the scrap rate. Bonderizing brings production through the dies in condition to keep your line moving.

A smoother finish

Bonderizing before forming or drawing results in a smoother finished product. The nonmetallic phosphate crystals of the Bonderite coating absorb and hold lubricants under pressure, act as an anti-flux to reduce galling and scratching, speed production, and increase die and tool life.

Increases production

The use of Bonderite prior to forming or drawing can mean greater production and lower unit costs by keeping pieces off the repair line and on the assembly line. Thus Bonderizing contributes to continuous, efficient conveyor line operation.

How about pre-finishing?

Manufacturers turning to automatic pre-finishing of flat metal stock can further benefit by Bonderizing prior to forming or drawing. Bonderite can cut costs here, too!

Saving money for others now!

Hub cap production in one plant is up 100%, costs are down about 40% with blanks Bonderized before forming. Other manufacturers report big savings, too. We'll gladly work with you to determine the application of this new technique to *your* production.

Bonderite, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

Parker

PARKER RUST PROOF COMPANY
2199 East Milwaukee Ave.
Detroit 11, Michigan

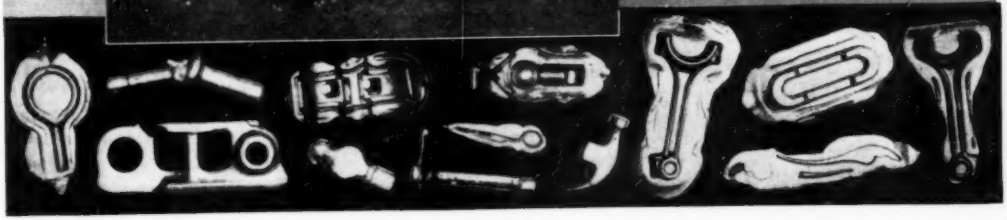
BONDERIZING Holds Paint to Metal . . . PARKERIZING Inhibits Rust . . . PARCO LUBRIZING Retards Wear on Friction Surfaces

CECO-DROP

THE *New* PISTON LIFT GRAVITY DROP HAMMER

The CECO-DROP forges more minutes per hour, makes more forgings with fewer blows, is safer and easier to operate, costs less to operate.

CHAMBERSBURG ENGINEERING CO.
Chambersburg Penna.



COPPER ALLOY BULLETIN

ROD AND WIRE EDITION

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by Bridgeport Brass Co. "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE and COPPER*

Machining Duronze* III Silicon Aluminum Bronze

Product design engineers are specifying stronger, more corrosion-resisting alloys to increase service life and reduce maintenance of engineering products. This explains the rapidly increasing use of alloys such as Duronze III silicon aluminum bronze, which contains about 91% copper, 7% aluminum, and 2% silicon. Bridgeport supplies this alloy in round, hexagon, and square rods for meeting the requirements of production turning and hot forging processes. Although it contains no lead, it possesses good free-machining characteristics. Experience gained from machining millions of pounds of this alloy indicates that under proper conditions of operation, Duronze III is very satisfactory for screw machine work.

What Cutting Speeds Should Be Used?

There are two schools of thought in regard to operating speeds—slower speeds with heavier feeds versus fast speeds with lighter cuts. Slower speeds permit the use of high speed steel tools and do not involve the problem of excessive heating. A Rockwell hardness of C-63 to C-65 is recommended for high speed tools.

Regardless of the type of tools used, they should be kept sharp and designed with the proper tool angles which are very important. It is recommended that tools should be ground approximately the same as required for free-cutting steel which is approximately half-way between the rake used for cutting free turning brass and that for cutting ordinary steel.

For the lower cutting speeds, some operators prefer the same rake as used for free cutting brass. Taps should be ground to eliminate the formation of hooks to prevent overheating and binding of the metal. A certain amount of experimentation is desirable until the operator obtains satisfactory quality and production.

For high speed operation, carboloy-tipped tools are necessary for cutting Duronze III. The recommended rake and land angles are illustrated in Figure 1. The character of the chips is typical of free machining alloys.

High speed drills having large flutes permitting adequate chip clearance are used in drilling, with drill speeds and feeds approximating those used in turning and forming. Close hole sizing is usually obtained through use of standard reamers. Reamers used commonly have 3° to 6° back rake, narrow lands and 6° to 8° clearance.

Tapping results are good if a gun type or spiral cutting tap is used, as it is very important to keep chips clear of the work. Chasers should incorporate a rake angle of 5° to 8° and be backed off at the lands.

Experiments with Coolants

Due to higher pressures necessary to machine Duronze III, more heat is generated than for brass, and the tools and work must be kept cool for proper efficiency. It is, therefore, very important that ample coolant or lubricant flow on the work and tools at all times.

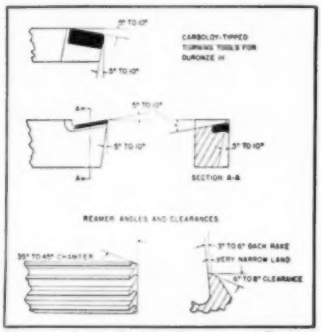
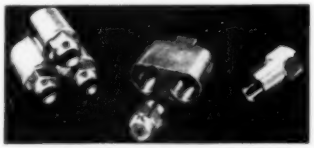


Figure 1—Lathe Tool for Forming and Turning Duronze III, also Reamer Angles and Clearances.

Research and experiments carried out under the supervision of our Metallurgical Laboratory have shown interesting results regarding the influence of various cooling liquids on machinability shown in Table I. Exceptionally good results have been obtained on high speed operation from soluble oils. These should be of the best quality and thinned with 15 to 30 parts of water to get good cooling effect. Sulphur-base mineral lubricants, thinned with kerosene or Mineral Seal oil to have a viscosity of 100 110 Saybolt seconds have also proved satisfactory.



Oil burner nozzles made from Duronze III for better maintenance of oil flow through nozzle opening. Housings from extruded brass shapes and hexagon rod. Courtesy Atlantic Manufacturing Company, Milford, Conn.

Thorough study of the physical requirements of a part component which is machined on automatics or turret lathes, in the light of materials available, and a complete investigation of the relative machinability of various alloys can be the means of producing parts of high quality and relatively low cost. *Reg. U. S. Pat. Off.

Table I—Effect of Cooling Medium on the Machinability of Duronze III.

TYPE OF TOOL		FEED PER REVOLUTION		SURFACE FEET PER MIN. HIGH SPEED TOOLS	
				Cutting Oil	Soluble Oil
Box Tool	Roughing	Light Cut	.008	180 to 200	300 to 360
		Heavy Cut	.005		
Box Tool	Finishing	Approx. 1/64"	.010	180 to 200	300 to 360
Drills	1/4" Diam.		.005	100	180
Drills	1/2" Diam.		.007	100	200
Drills	3/4" Diam.		.007	100	200
Drills	1" Diam.		.006	100	200
Drills	3/8" Diam.		.005	100	200
Drills	1/2" Diam.		.005	100	200
Threading	External Dies			40 to 50	100 to 120
Threading	Internal Taps			30 to 40	90 to 100
Form Tools		Heavy Cut	.001		
		Light Cut	.002	180	300
Cut-off Tools			.0025	180	300

BRASS · BRONZE · COPPER · DURONZE — STRIP · ROD · WIRE · TUBING

MILLS IN
BRIDGEPORT, CONNECTICUT
INDIANAPOLIS, INDIANA

In Canada:
Noranda Copper and Brass Limited, Montreal

BRIDGEPORT BRASS COMPANY
BRIDGEPORT 2, CONNECTICUT
Established 1865
"Bridgeport" BRASS CO. *District Offices and Warehouses in Principal Cities*

POPE

Sealed Package SPINDLES

The Spindles pictured are among the most popular and widely used of the many Pope *Sealed Package* Spindles.

These Spindles assure you:

Continuous Production of High Quality
Cool Operation at High Speeds
Sealed Lubrication Performance

— no oiling or greasing, nothing to renew, replace or adjust throughout the entire life of the bearings.

This new P-32T 6" x 18" Surface Grinder Spindle is a complete Sealed Package. It has a full 1 H.P., 3450 RPM totally enclosed motor. It is the outstanding spindle for surface grinding. Ask for the Pope Sealed Package Spindle, *P-32T.*

This Pope Tool Grinder Spindle is equipped with 1 H.P., 3450 RPM totally enclosed motor; for grinding wheels up to 8" O. D., ¾" face, 1¼" hole. *Sealed* Lubrication. Ask for *P-1004.*

This Pope Heavy Duty Spindle with totally enclosed fan cooled motor is ideal for surface grinding. It can be mounted on planers and boring mills. It comes in a variety of sizes from ¾ to 20 H.P. and from 900 to 3600 RPM. *Sealed* Lubrication. Ask for *P-2500.*

This Pope Heavy Duty Vee Belt Driven Wheel Head Spindle takes grinding wheels from 6" to 36" diameter. Maximum speed 4000 RPM. Ask for *P-666.*

No. 58

POPE POPE MACHINERY CORPORATION
ESTABLISHED 1920
261 RIVER STREET • HAVERHILL, MASSACHUSETTS
BUILDERS OF PRECISION SPINDLES

Positive action of BARRETT TYPHOON CENTRIFUGAL WASHERS provides for quick, thorough parts cleansing

In these efficient centrifugal machines the washing solution enters the top of the whirling load under valve control. The operating principle—being that of a typhoon—gives the washing solution a spraying, swirling, and surging action which thoroughly permeates the contents. During this action, centrifugal force creates hydrostatic pressure within the basket. That proportion of the deluge going to the bottom is forced up the side and out carrying off the contaminated fluid.

A thorough, quick cleaning is definitely assured by flowing sequence. Two or more liquids may follow, making it possible to wash, rinse or provide any further treatment as required.

Several Barrett installations involve the use of four machines operated by one man who loads and unloads in three minute cycles. Washing time is only one minute. Another type of set-up provides for recovering oil, washing, drying, and coating with rust-proofing material.

As in all Barrett Centrifugal machines, provision is made for convenience and safety of operation.

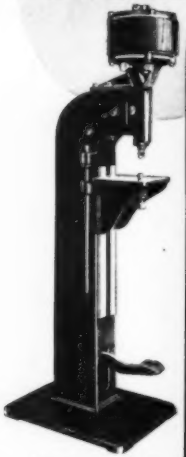
Send at once for details of Barrett Typhoon Washer

Barrett Centrifugal Washer—made in capacities from 13 to 38 cu. ft. per hour. Each size, depending on condition, will perform at the rate of 20 duty cycles per hour.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

LINLEY



WHERE RIVETING "KNOW-HOW" COUNTS

The practical knowledge that has solved many an "impossible" riveting problem is built right into Linley Riveting Machines. Designed to maintain accuracy and quality of work under hardest conditions. Rotary spinning principle shapes heads noiselessly . . . capacities to ⅛" diameter. Adjustable spindle stroke, controlled pressure . . . thrust bearing supports spindle, carries load. Eight models. Bring our experience into your plant and make your tough jobs easy.

SEND SAMPLES
We will gladly rivet sample parts and return them for your inspection.

LINLEY BROTHERS CO.
674 STATE ST., EXTENSION
BRIDGEPORT 1, CONNECTICUT

LLN 49

RIDERMIKROKATOR ... for OUTSIDE MEASUREMENTS

The Ridermikrokator is intended for checking out-of-roundness and diameters of cylindrical parts. As the measurements are carried out according to the three point principle the instrument can be used to good advantage for checking centerless-ground pieces.

They are provided with hardened, ground and lapped anvils and insulating grips. The measuring surfaces of the anvils can be tipped with cemented carbide. Price on application.

This instrument is supplied with removable measuring points with ranges from 3/16" to 4¾".

Prices and Literature Upon Application

Setting ridermikrokator by means of a master.

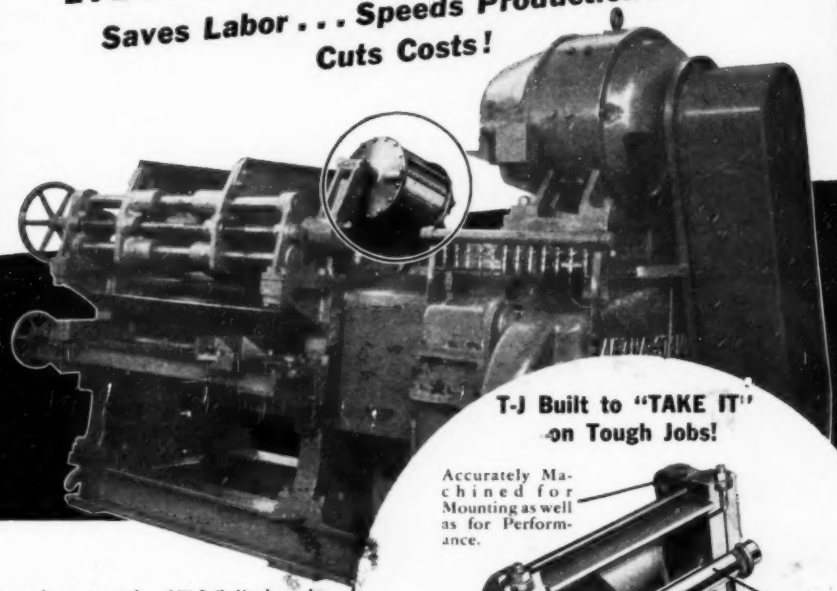
SWEDISH GAGE CO. OF AMERICA
8900 ALPINE AVE. DETROIT 4, MICH.

Job File No. 1001

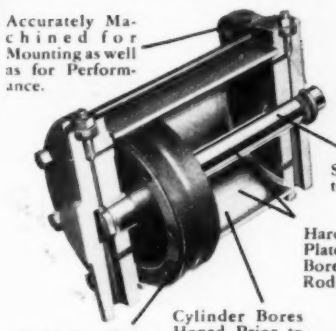
T-J CYLINDER

EJECTS 6-TON STEEL COILS

Saves Labor . . . Speeds Production . . . Cuts Costs!



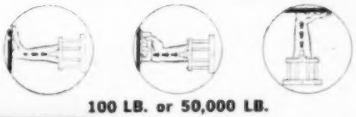
T-J Built to "TAKE IT" on Tough Jobs!


Accurately Machined for Mounting as well as for Performance.
Shouldered Piston Rods.
Hard Chromium Plated Cylinder Bores and Piston Rods.
Cylinder Bores Honed Prior to Hard Chromium Plating.
Self Sealing Packings throughout.

Here's another example of T-J Cylinders doing a job of power movement for industry . . . *efficiently . . . accurately . . . automatically.* This machine is an Aetna Standard Roll Type Coiler, which employs a T-J Air Cylinder to eject steel coils weighing up to 12,000 lbs.! As the strip of steel is completely coiled, kick-out fingers operated by the cylinder raise the coil and push it forward where it rolls on to conveyor.

T-J Air and Hydraulic Cylinders are built for 1001 tough jobs like this, where pushing, pulling or lifting is needed . . . 100 lb. or 50,000 lb. Available in many standard sizes and styles . . . both cushioned and non-cushioned types. Backed by 32 years' experience . . . built for long-life dependability. Write for latest catalogs. The Tomkins-Johnson Co., Jackson, Michigan.

FOR POWER MOVEMENT IN ANY DIRECTION



100 LB. or 50,000 LB.

T-J 32 YEARS EXPERIENCE

TOMKINS-JOHNSON

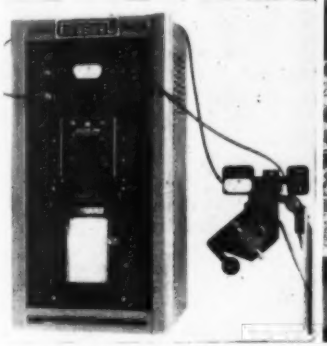
RIVETORS . . AIR AND HYDRAULIC CYLINDERS . . CUTTERS . . CLINCHORS

DIAL INDICATORS — Fast, positive visibility. Every size, graduation, range and type — accurate, dependable, adaptable.

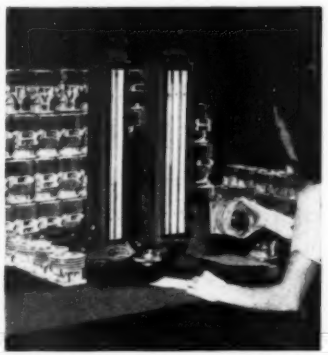
DIAL INDICATOR GAGES — Model 1340 Snap Gage — one of 65 catalog gages. Greatest variety by any gage manufacturer.

SPECIAL GAGES — One of over 10,000 specially designed gages. We build single and multiple purpose gages to meet your requirements.

ELECTRONIC-AUTOMATIC SORTING — The ultimate in 100% gaging — fast, stable, accurate. Engineered to your product.



CONTINUOUS MEASURING—Four basic types — adaptable to all kinds of materials and conditions.



AIR GAGES — Ultra accurate, positively fool proof, maintenance-free — in single, multiple, and special designs.

Are YOU the one who doesn't know

FEDERAL makes every type of Indicating Gage?

Wide, continuous experience gave us the know-how to design gages that produce better quality at lower cost.

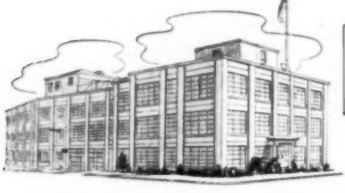
YOU may know that Federal makes more Dial Indicators and Dial Gages than any other manufacturer. But, note this too—the entire Federal Plant is devoted exclusively to the design and production of *every type* of Indicating Precision Instrument by the latest scientific methods.

We engineer and make Automatic Sorting Gages, Signal and Automatic Control Gages, Continuous Measuring Gages in great variety to control dimensional accuracy as wanted.

We have made gaging devices for controlling the dimensions of every sort of article from wire staples to railroad splice bars, from sausage skins to jet engines; gages that do jobs people said couldn't be done.

Take advantage of the practical savings secured from these gages. The proper gage, properly applied, costs nothing. It collects money on saved scrap and eliminated operations.

For data on any of these gages write to Gaging Headquarters — Federal Products Corporation 1102 Eddy St., Providence 1, R. I.



FEDERAL

PRECISION MEASURING INSTRUMENTS

DIAL INDICATORS • INDICATING GAGES • SPECIAL GAGES • ELECTRONIC AND AUTOMATIC SORTING GAGES • AIR GAGES

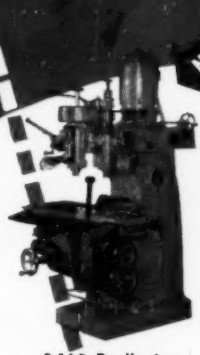
Send FOR THIS CATALOG

It will acquaint you with the complete line of GORTON TRACER-CONTROLLED MACHINE TOOLS and Accessories

Send for your copy today. Gorton tracer-controlled milling embodies distinct advantages on the production line and in the tool room. In many cases, special tooling will make a given operation entirely automatic. Send for the Gorton Condensed Catalog illustrated above or for any of the other specialized bulletins described below — they were published for your information and reference.

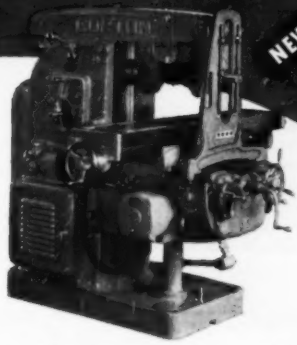
0-16A Vertical

A new and improved development in a small size, sensitive vertical mill and router. Incorporates all of the desirable features of former 8-D. Also available with swivel or universal head. Request Bulletin 2240.



0-16B Duplicator

A new and better small size tracer controlled duplicator which embodies all of the advantages of the former 8-D. Rugged, versatile and extra sensitive for exacting die and mold work. Also available with swivel or universal head. Request Bulletin 1319.



2-28B Horizontal

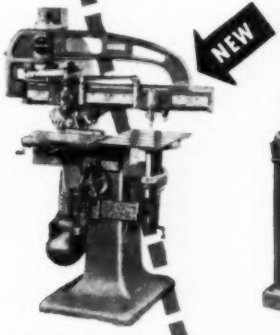
A new contribution to production milling. No. 2 size, fullwidth plain type mill with 10 H.P. spindle drive and speeds up to 2,000 r.p.m. Built for maximum rigidity and a work horse load. Request Bulletin 2321.

9-J Duplicator

One of the most popular and practical die and mold duplicators ever built. Rugged in construction; has *Gorton super-speed spindle and sensitive controls for the most exacting work. Request Bulletin 1319.

3-U Pantograph

The most used 2-dimensional pantograph in the metal-working field. Sturdy and rigid with sensitive tracer control. Larger and heavier 3-Z model also available. Request Bulletin 1580.



P13 Pantograph

The Gorton †Ratiobar Pantograph for 3-dimensional work offers the first basic design improvement in pantograph construction. Simpler to operate, more rigid, and accurate for small dies, molds and hobs. Easily converted for 2-dimensional work. Request Bulletin 2310.

375-2 Cutter Grinder

Universal type bench or floor models; capacity up to ⅝" dia., including ball nose and multi-flute cutters of almost any diameter, taper, shape or clearance. For carbide cutters, diamond wheels are used. Choice of tool heads and attachments. Request Bulletin 1317.

16-B Automatic Lathe

For precision turning of long slender parts from .005" dia., by 1/32" long to 7/16" dia., by 2¼" long. This Gorton Swiss-type Automatic solves many precision turning problems. Request Bulletin 1800.

*Trade Mark
Reg. U. S. Pat. Office

†Pats. Applied For

GEORGE GORTON MACHINE CO.

1503 Racine Street, Racine, Wisconsin, U. S. A.

Please Send at Once

For brief facts about the Gorton line of tracer-controlled machines, use coupon or company letterhead and request Bulletin 1655 illustrated above. For specific information on certain machines, see text accompanying each illustration.

Name.....

Title.....

Address.....State...

It isn't polite to point, but....

Look at this!

THIS head has been designed mainly for high speeds, although it is also used for large cluster boxes on way type machines.

Designed to eliminate oil seals and other rubbing parts, it is fully ball bearing equipped. It contains an oil pump with a built-in trouble-free vane type pump, which pumps the oil to the top of the head and by centrifugal force spreads the oil over the entire upper surface of the head, then cascades down over the bearings and gears.

Ideal for high speed sensitive drilling machines, its castings are made of high-grade aluminum alloy. All spindles and shafts are made of alloy steel properly heat-treated and ground.

34 Spindles in 6" Square
Oil circulating with self-contained pump, speeds in excess of 10,000 RPM.

FIXED CENTER OIL CIRCULATING HEAD

IMMEDIATE DELIVERY!

US HEADS
SINCE 1915

We manufacture all types of multiple spindle, fixed center, adjustable and lead screw tapping heads.

UNITED STATES DRILL HEAD CO. CINCINNATI 4, OHIO

WILLEY'S TUNGSTEN CARBIDE TOOLS

Willey's — The COMPLETE LINE of cutting tools—made complete in our own factories. Hundreds of standard sizes in stock. Prompt service on special tools built to your specifications.

We are now filling orders calling for the new industry standard tool numbers and sizes.

CATALOG

Mailed on request. Please use your business letterhead.

STANDARD TOOLS

SOLID TUNGSTEN CARBIDE REAMERS

TIPPED TWIST DRILLS

SOLID TUNGSTEN CARBIDE ROUTER BITS

WILLEY'S CARBIDE TOOL CO.
1342 W. Vernor Highway — Detroit 1, Michigan

HYDRAULIC PRESSES
30 to 1,000 Ton—Built to Order
Write for illustrated catalog
M & N MACHINE TOOL WORKS, INC.
152 ORONO ST. — CLIFTON, N. J.

---

60 YEARS MANUFACTURING
Multiple Spindle Drilling and Tapping Machines — Automatic Drilling and Tapping Units — Multiple Spindle Attachable Drill Heads — Hot and Cold Swaging Machines — Hammering Machines — Tools, Jigs & Fixtures — Contract Work — Special Machinery
LANGELIER MANUFACTURING COMPANY,
PROVIDENCE 7, RHODE ISLAND

The very best facilities for

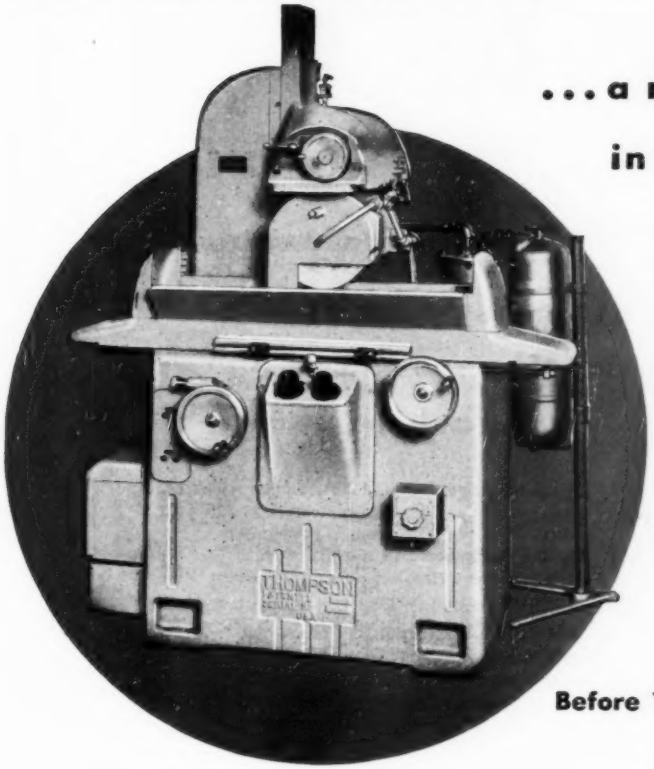
STAMPINGS

In Small Lots

DAYTON ROGERS
Manufacturing Company
Minneapolis (7), Minn.

COOLANT THROUGH WHEEL

GREATLY IMPROVES GRINDING METHODS



. . . a new development in surface grinding by THOMPSON

Now you can grind very thin sections without burning and warpage.

Before You Buy

Investigate

Thompson provides a full range of machine sizes from 6" x 18" to 36" x 240" utilizing the new principle of applying coolant to the grinding wheel. The new Thompson Type "F" Hydraulic Surface Grinder with coolant through the wheel is shown above. All of the coolant is applied through the grinding wheel, making it possible to grind exceedingly thin sections without burning or warping the work.

Very fine finishes are obtained to extremely close dimensions. An outstanding advantage of this patented process is gained in grinding blanking dies and other metal cutting or shearing tools. No amorphus metal is present after grinding. This increases the life of the tool between grinds.

WRITE TODAY **for details of this new process and for information on ways it can save you production time and money! Address Dept. 10, The Thompson Grinder Company, Springfield, Ohio.**

Thompson SURFACE Grinders

Design for user satisfaction...

...by designing a "built-in" lubricating system into your machine.

You assure your customer of uninterrupted production and cut down on your servicing costs when you design a Bijur system of automatic "metered" lubrication into your machines *at the time of manufacture*.

By concentrating all oiling points into one, this system *automatically* provides a controlled oil feed for all bearings regularly while the machine is running.

By thus eliminating the human element from the oiling routine, you do away with down-time for oiling, "forgotten" bearings, and a general feast and famine condition at the bearings.

Modern Design. Building the system into the machine at time of manufacture assures improved performance by coordinating lubrication and machine design, and produces a clean-lined machine with a minimum of projecting parts.

"Metered" Lubrication. Your machine will run more smoothly on Bijur-oiled bearings over a longer period of time. The system automatically controls the oil flow through a single-line distribution system to a series of meter-units, maintaining the correct oil film *at each individual bearing*.

When you consider the lubrication of that new machine, call on the Bijur engineer, or write for "The Travels of Modern Lubrication." This quarterly bulletin shows how leading machine manufacturers design "built-in" lubrication into their latest models.

BIJUR

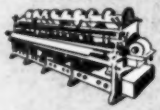
LUBRICATING CORPORATION

LONG ISLAND CITY 1 NEW YORK

Leading manufacturers who standardize on the Bijur system.

MACHINE TOOLS
Monarch "Lathe"

PRINTING PRESS
Miehle "Press"



TEXTILE MACHINERY
Whitin
"Knitting Machine"

PUNCH PRESSES
Bliss "Inclinable Press"

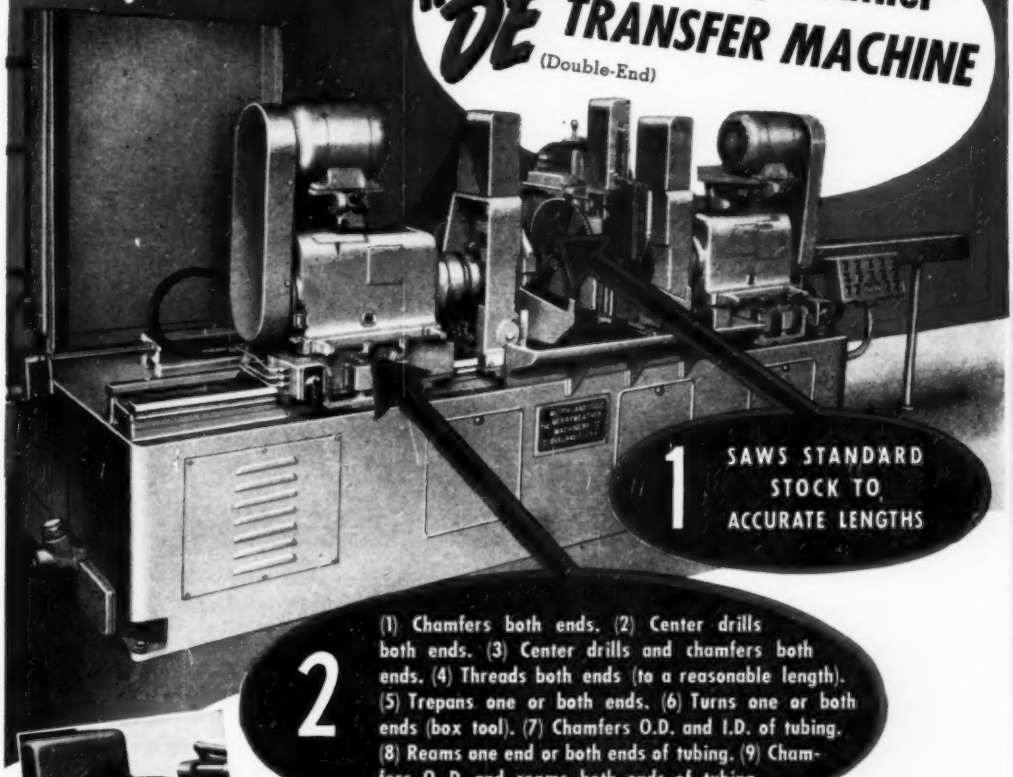
FOOD MACHINERY
Food Machinery "Filler"

Like these manufacturers, you too can "be sure with Bijur."

Substitute 1 Machine for 3 or 4!

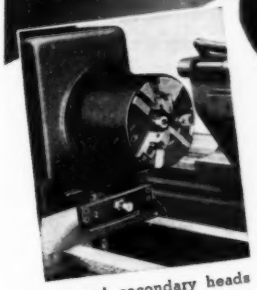
The Motch & Merryweather "DE" TRANSFER MACHINE

(Double-End)



1 SAWS STANDARD STOCK TO ACCURATE LENGTHS

2 (1) Chamfers both ends. (2) Center drills both ends. (3) Center drills and chamfers both ends. (4) Threads both ends (to a reasonable length). (5) Trepans one or both ends. (6) Turns one or both ends (box tool). (7) Chamfers O.D. and I.D. of tubing. (8) Reams one end or both ends of tubing. (9) Chamfers O. D. and reams both ends of tubing.



Rugged secondary heads with simple gear reduction to husky spindle. Positioning slide adjusted quickly by rack and pinion. Hydraulic feeds and variable speeds.

MORE THAN A NEW MACHINE—ACTUALLY A NEW METHOD

The Motch and Merryweather "DE" (double end) Transfer Machine has no equivalent. Standard bar stock is automatically fed, cut off with a square *milled finish*, to accurate lengths of ±.004"; then automatically transferred to equalizing, self-centering jaws for accurate double-end machining. You save at least one operator; save several handlings; save overhead and floor space; save tooling. Husky construction makes for trouble-free service and long, profitable life.

Get the facts about this remarkable new but thoroughly proven machine.

Only M & M builds ALL 3: CIRCULAR SAW · SAW BLADE · BLADE GRINDER

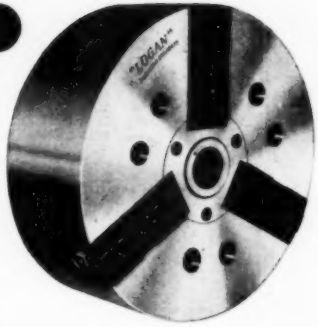
THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING • CLEVELAND 13, OHIO

AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

* Fluid Power Improves Production

"LOGAN"

AIR AND HYDRAULIC POWER-OPERATED CHUCKS



...WITH OPEN OR CLOSED CENTER

***FREE ENGINEERING SERVICE**

Our engineers will solve your chucking problems with Logan special chucks, mandrels and collet chucks. No obligation.

• 32 years' engineering know-how • Completely equipped plant • Satisfaction assured • Complete range of standard types • Extra factors of strength and durability • Accurate, dependable service.

For your complete air and hydraulic chucking systems, Logan offers an extensive line of rotating cylinders, control valves, accessories, hydraulic power units and Collet Grip tube fittings.

Logan SAVES *TIME *EFFORT *MOTION

Air and Hydraulic Equipment

FREE CATALOGS

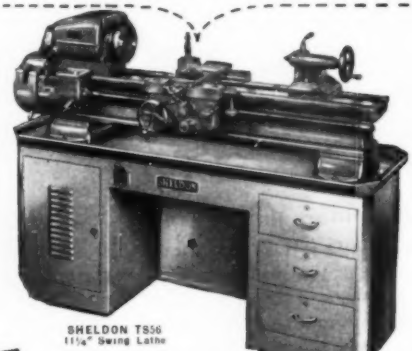
Write for catalog No. 70, Section 1, on Logan air and hydraulic-operated chucks; catalogs Nos. 90 and 91 on air valves and cylinders.

LOGANSPORT MACHINE CO., INC. 818 Center Ave. Logansport Indiana

CHUCKS • CYLINDERS • VALVES • PRESSES • SURE-FLOW COOLANT PUMPS

FLUID POWER SPECIALISTS SINCE 1916

Replace those off-size "war babies" with modern SHELDON Lathes



SHELDON T856
11¼" Swing Lathe

TU-1248P
13½" Swing Lathe

L-46
10½" Swing Lathe

5 years ago you took what you could get and did a job with it. Today you can get better lathes that will lower costs while increasing output.

With every increase in labor and other costs, the losses from operating "war babies" and antiquated "clunkers" increases. With modern SHELDON Precision Lathes you can do more accurate work, and do it faster, easier in less floor space and with lower power cost.

With "Zero Precision" Tapered Roller bearings a run-out accuracy of .00015, extra collet capacity and modern 4-speed V-belt drives, these moderate priced lathes will work to the closest tolerances and hold their accuracy under continuous, full speed, full capacity operation.

SHELDON MACHINE CO., Inc.
4234 N. KNOX AVE., CHICAGO 41, ILLINOIS, U.S.A.

Die-Making Machines

They save 50% on sawing, filing and lapping operations, easily maintaining .002" limits. Ask for special bulletin—also circulars on Drill Grinders, Point Thinners, Tool and Cutter Grinders, Face Mill Grinders and Tool Bit Grinders.

OLIVER OF ADRIAN PRODUCTS

Oliver Instrument Co., 1414 Maumee St., Adrian, Mich.

PRESSES • FEEDS
AUTOMATIC EQUIPMENT
The VEO Press Company
HUDSON, NEW YORK

FORGINGS and STAMPINGS

DIXISTEEL forgings and stampings are made of carefully analyzed steel produced in our own open hearth furnaces. They are of highest quality and strength.

Send us your prints or specifications for forged or stamped parts, and we will be pleased to submit our estimate for production.

ATLANTIC STEEL COMPANY
P. O. BOX 1714 DIXISTEEL ATLANTA 1, GEORGIA

Steel-Weld FABRICATION

In Steel-Weld Fabrication, where craftsmanship of the individual workman is immediately apparent in the finished product, the Mahon Company excels. Complimentary letters from pleased customers are not uncommon in the Mahon organization—and they are considered rich compensation, because in this current era, word of a job well done travels fast and far . . . it is responsible for many new customers. The Mahon Company offers you a unique source for welded steel in any form, regardless of shape, size or weight . . . a source with complete heavy machining facilities and a staff of thoroughly competent design engineers. This combination assures you a better, smoother appearing job, embodying every advantage of Steel-Weld Fabrication.

THE R. C. MAHON COMPANY
Detroit 11, Michigan

Engineers and Fabricators of Welded Steel Machine Bases and Frames, and Many Other Welded Steel Products

MAHON

Apex makes the RIGHT socket wrench for YOU!

Hex or square . . . standard or special nuts . . . power or hand driven . . . it's all the same to Apex!

The Apex line includes standard sockets, thin wall, extra long, and extra long thin wall. Also extensions, straight nut setters, universal adapters, universal wrenches—and many others.

Apex socket wrenches are accurately machined from electric furnace high carbon alloy bars—cold broached and carefully heat treated.

For the hard-to-get-at places Apex universal or tension wrenches are the answer. They cannot bind or lock at any angle and they meet all safety requirements.

Catalog No. 19 lists thousands of standard items. But if you need specials, just send us sketch, print or description and we'll quote promptly.

Catalogs will be sent only upon requests made on company letterheads.

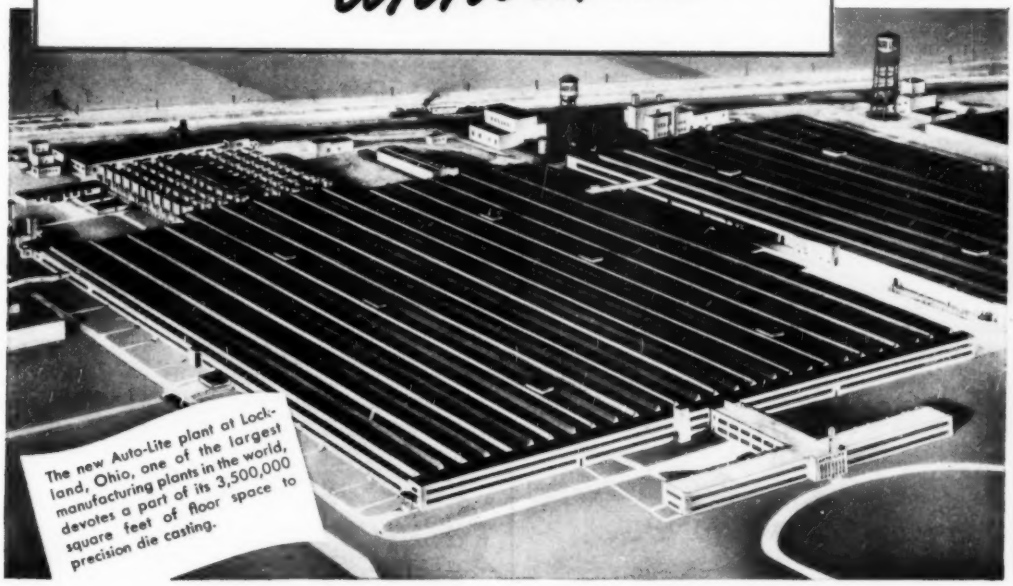
APEX sockets

THE APEX MACHINE & TOOL COMPANY, 1030 S. Patterson Blvd., Dayton 2, Ohio

Safety Friction Tapping Chucks • Quick Change and Positive Drive Drill Chucks • Vertical Float Tapping Chucks • Parallel Floating Tool Holders • Power Bits for Phillips, Slotted Head, Frearson and Clutch Head Screws • Hand Drivers for Phillips, Frearson and Clutch Head Screws • Aircraft and Industrial Universal Joints • Sockets and Universal Joint Socket Wrenches

AUTO-LITE *announces...*

Tune in "Suspense!", Radio Adventure at its Greatest —Thursday, 9:00 P. M., E. S. T. on CBS



The new Auto-Lite plant at Lockland, Ohio, one of the largest manufacturing plants in the world, devotes a part of its 3,500,000 square feet of floor space to precision die casting.

Increased production facilities for

DIE CASTINGS

● Here is important news for everyone who has need of the accurate, reliable die castings made possible with the famous Auto-Lite "controlled metals" processes. The opening of the great new Lockland plant of Auto-Lite, combined with the enlarged facilities at Woodstock, Illinois, greatly increases Auto-Lite's ability to furnish the high quality die castings for which the Auto-Lite name is known wherever die castings are used. We invite your inquiries.

AUTO-LITE MEANS PRECISION MANUFACTURING

THE ELECTRIC AUTO-LITE COMPANY
Die Casting Division, Woodstock, Illinois

600 S. Michigan Avenue
Chicago 5, Illinois

723 New Center Bldg.
Detroit 2, Michigan

The

GOSS & De LEEUW

ONE TWO THREE

7 spindle tool rotating automatic chucking machine

Four Machine Spindles for boring, turning, facing and reaming operations on one to three ends provide greater and quicker production than any other "chucker" in the machine tool industry.

Three Threading Spindles perform from one to three right or left hand single or double threading operations, on one, two or three ends simultaneously, in perfect alignment, at productions from 100 to 500 pieces per hour.

Write for further interesting details.

Goss & DeLeeuw
MACHINE COMPANY
KENSINGTON, CONNECTICUT, U.S.A.

for Sawing METAL *as* HARD *as a* FILE
or Trimming FORMED PARTS
- FAST!

Actual photo of file friction sawn on Tannewitz High Speed Band Saw.

Tannewitz
HIGH SPEED BAND SAWS

Cost reductions that are downright amazing are effected in the cutting of an extremely wide variety of materials by friction sawing with TANNEWITZ HIGH SPEED BAND SAWS: flat sheets, hardened or soft steels, armor plate plastics, and many others. Formed aluminum parts can be trimmed without using a rest of any kind. Whatever your cutting problem, chances are it can be done faster and better with TANNEWITZ HIGH SPEED BAND SAWS. Write for booklet: "FRICTION SAWING."

THE TANNEWITZ WORKS
GRAND RAPIDS 4, MICHIGAN

Famous for

- ACCURACY OF THREADS
- LOW CHASER COST
- ALL AROUND DEPENDABILITY

Bulletins available: General Purpose Die Heads, Insert Chaser Die Head, Threading Machines.

H&G DIE HEAD

See our Advt. on Page 30 Feb. 10-49 American Machinist

THE EASTERN MACHINE SCREW CORP., 29-40 Barclay St., New Haven, Conn.
Pacific Coast Representative: *A. C. Behringer, 854 N. San Pedro St., Los Angeles California.* **Canada:** *F. F. Barber Machinery Co., Toronto, Canada.*

LUERS Patented Cutting Off Tool Holders
Patented Cutting Off Blades

ONLY the PATENTED construction of LUERS cutting off BLADES permits normal expansion of bursting chips — MEANS MAXIMUM CUTTING EFFICIENCY.

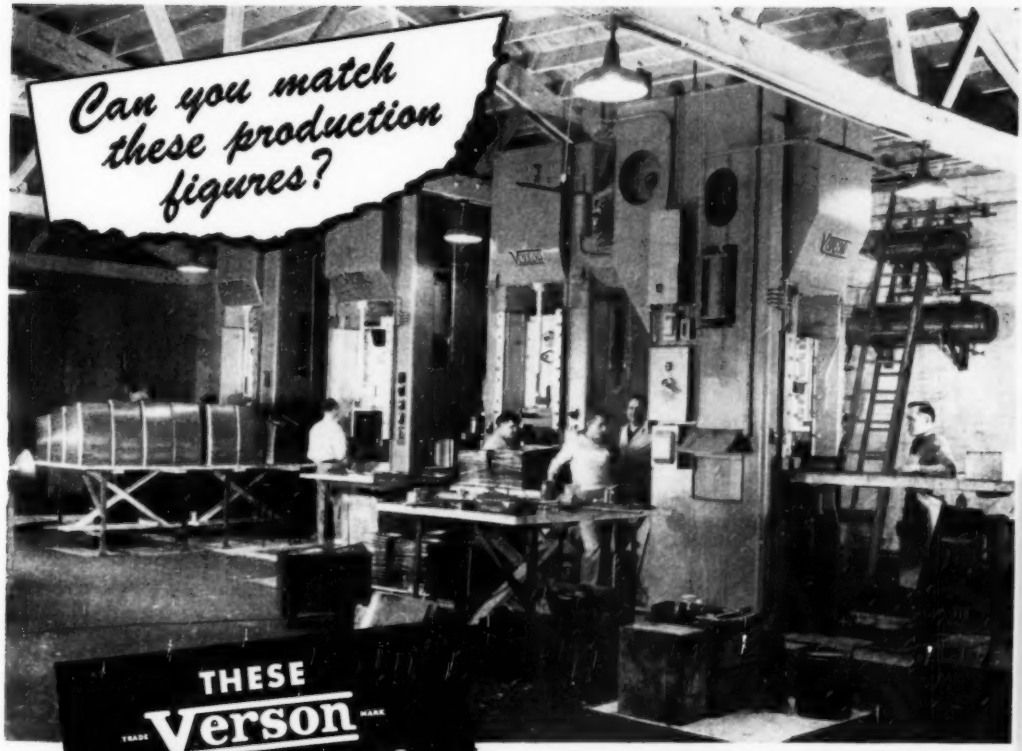
Manufactured By
J. Milton Luers — 12 Pine St. — Mt. Clemens, Mich.
Produced under License Issued by John Milton Luers Patents Inc.

HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

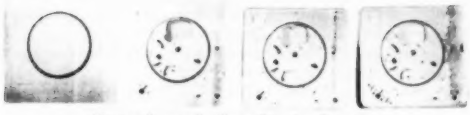
MODEL D-1 DIAL TYPE
Write for Circular!

THE SHORE INSTRUMENT & MANUFACTURING CO., INC.
9025 VAN WYCK AVENUE
JAMAICA, NEW YORK
TELEPHONE: JAMAICA 6-4090



THESE TRADE Verson MARK FULL ECCENTRIC PRESSES

Produce motor boards for automatic record players at the rate of 650 per hour!



Stages in production of motor boards

First Operation: Cut-off and drawing

Second Operation: Trim and Pierce

Third Operation: Forming

Fourth Operation: Final Pierce

The group of Verson Full Eccentric Presses illustrated above form a compact production unit that makes full use of Verson's advantages of speed, accuracy and power. Stock is automatically fed into the press at the extreme right where the first cut-off and drawing operation takes place. The pieces move on for trimming and piercing on the second press and forming in the third press. Final piercing is accomplished in the press at the extreme left. While set up for phonograph motor boards in this view, the presses can be changed over quickly for other jobs.

Get full details on how Verson Full Eccentric Presses can speed your production and lower your costs. And ask about such Verson features as: Allsteel Construction, Full Eccentric Action, "Straight Thrust" Eccentric Strap, Positive Action Clutch and Brake and others. Write today.

Originators and Pioneers of Allsteel Welded Stamping Press Construction

VERSON ALLSTEEL PRESS COMPANY

9316 South Kenwood Avenue, Chicago 19, Illinois — Holmes Street and Ledbetter Drive, Dallas 8, Texas

A VERSON PRESS FOR EVERY JOB FROM 60 TONS UP!

BLANKING PRESSES • FORGING PRESSES • DRAWING PRESSES • HYDRAULIC PRESSES
PRESS BRAKES • DIES • DIE CUSHIONS

it's NEW

it's MORE COMFORTABLE

it's RUGGED

Heavy Duty Glove

AO 5X264

Feel it, test it, wear it and you'll see why this latest addition to the AO steel stapled line is ideal for handling small castings, rough stock, grinding and similar work.

Made of specially treated chrome tanned cowhide leather for long wear, the glove features a canvas back with elastic strap to overcome hand fatigue while providing a cooler feeling and snug fit.

All seams are steel sewed and the seam along the forefinger has been eliminated for longer glove life and added comfort at this vulnerable point.

Wearing surface of the palm has also been increased by extending the palm — no bib patch — another comfort feature.

The steel stapled strap at the thumb crotch fortifies one of the weakest parts of a glove. There is a steel stapled patch on face of thumb and a short cufflex cuff with tape binding.

You'll lower your glove costs with the 5X264 — ask your AO Safety Representative or inquire at your nearest AO Branch Office.

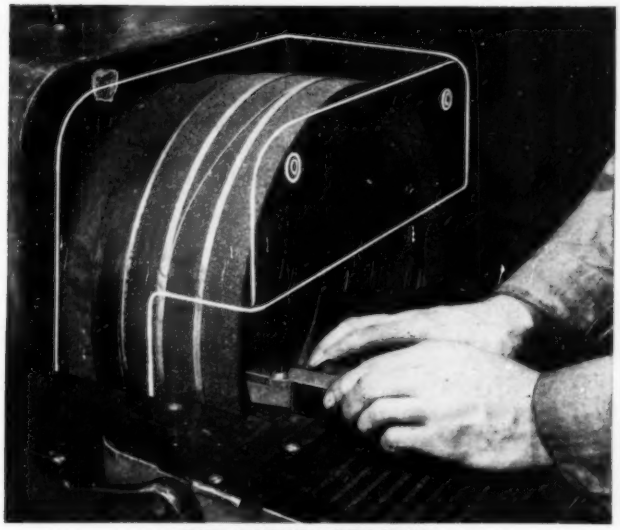
American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

BUXITE

GRINDING WHEELS FOR CARBIDE TOOLS

LIGHTER FEED... COOLER CUTTING



THE BUXITE PROCESS

(Formerly Controlled by The Bridgeport Safety Emery Wheel Co., Inc.)

The Buxite Process is a revolutionary method of coating **each individual grain** of Buxite wheels with a microscopically thin shell of carbon in an isotropic vitrescent form. Each shell permits its grain of abrasive to turn, exposing every cutting surface before it is worn away. Each succeeding layer of grains are contained in their individual carbon shells, assuring constant grinding action during the life of the wheel.

REPRESENTATIVES NOTE: There are a few desirable territories available to well qualified representatives. If you are interested, write us, giving full particulars of your operation and qualifications.

Buxite grinding wheels perform better and actually cut faster with light pressure. This means that carbides and other superhard steels can be ground with less heat being generated . . . which prevents checking and cracking, lengthening the life of the tools.

GRIND CARBIDE TOOLS AT 75% TO 85% LESS COST

Not only do Buxite wheels increase carbide tool life, but they give a cleaner grind and better finish. Buxite wheels do not "load" when grinding sintered tools, eliminating frequent stops for dressing, and the hard-shelled grains makes the life of each Buxite wheel 4 to 6 times that of ordinary wheels.

REDUCE DIAMOND WHEEL CONSUMPTION

The lighter cuts and cooler grinding action of Buxite grinding wheels results in excellent finish on Tungsten Carbide and other types of superhard alloys. Buxite wheels always reduce and frequently eliminate the need for diamond wheel grinding on this type of tool. This saving in diamond wheel consumption and costs is an important reason so many manufacturers and metal working shops have standardized on Buxite wheels for their tough grinding operations.

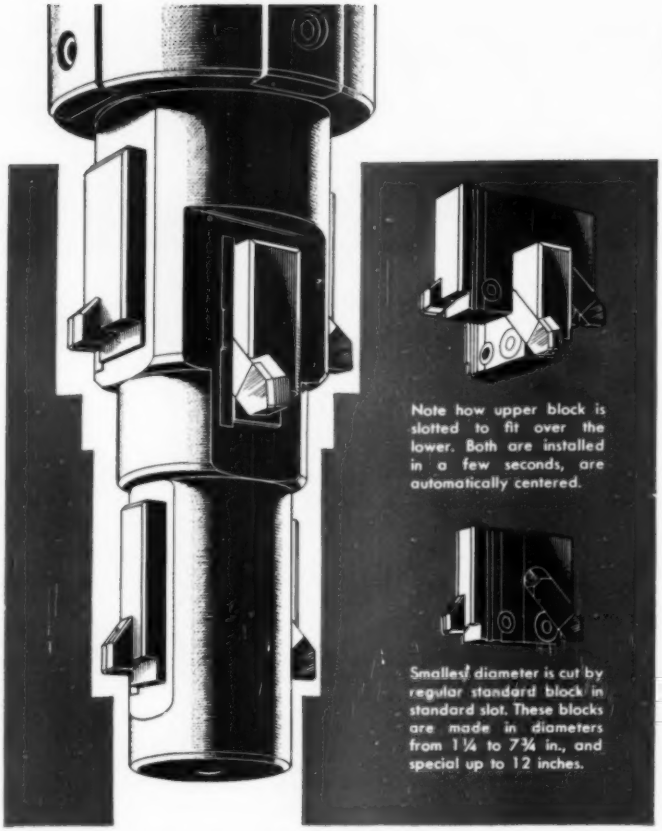
ADDITIONAL ADVANTAGES OF BUXITE WHEELS

Every feature of Buxite wheels contributes to faster production and lower piece cost on grinding operations involving super-hard tool steels. Faster, cooler cutting action, longer tool life, longer wheel life and reduction or elimination of diamond wheel consumption result in greatly lowered costs. If our representative has not called recently, write direct to us for additional information and money-saving facts.

MANSCO GRINDING WHEEL CO.

2104 EAST 38TH STREET CLEVELAND 15, OHIO

Exclusive Suppliers of BUXITE *Grinding Wheels*



Note how upper block is slotted to fit over the lower. Both are installed in a few seconds, are automatically centered.

Smallest diameter is cut by regular standard block in standard slot. These blocks are made in diameters from 1¼ to 7¾ in., and special up to 12 inches.

Gairing Boring Tools Boost Production

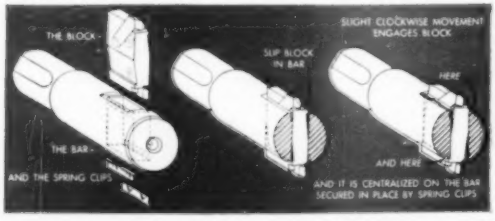
Quick-Change Blocks Save Man-Hours and Down-Time

Held in the boring bar without locating holes and screws, only GAIRING STANDARD BORING BLOCKS can be used in such applications as shown above.

The operation consists of boring diameters of 2.693, 2.228, and 1.875 inches in a tractor drive housing, cutting cast iron at a surface speed of 200 F.P.M., 0.020″ feed per revolution.

Here, as always, blocks are pre-set to size, perfectly self-centered; always positively locked, rigidly driven. They are used extensively for rough boring as well as for semi-finishing and reaming operations.

Let us show you how GAIRING BORING BLOCKS may be applied to your problems.


THE BLOCK
SLIP BLOCK IN BAR
SLIGHT CLOCKWISE MOVEMENT ENGAGES BLOCK
HERE
THE BAR
AND THE SPRING CLIPS
AND HERE
AND IT IS CENTRALIZED ON THE BAR SECURED IN PLACE BY SPRING CLIPS

Write today for the Gairing Block-Type Boring Tool Catalog

GAIRING TOOL COMPANY, 21226 Hoover Rd., Detroit 32, Michigan

MODERN TESTING METHODS— What they are... How to use them...

"Non-destructive Testing Methods", a 24-page *American Machinist* Special Report, gives all the facts on how to scientifically test parts, pieces, structural materials, rough castings, dies, and any other formed piece subject to defect.

This Special Report explains in detail the supersonic, radiographic, spectroscopic and magnetic methods of inspection . . . points out how each can be used effectively. Illustrations, graphs, photographs, clarify the factual, authoritative text.

Non-destructive testing, recognized as the most practical way of checking on a production basis, is particularly important because a thorough check at all points is possible without damage to the part or material being tested. This compact, up-to-the-minute survey on non-destructive testing goes into the many new or improved methods used today, points out their particular advantages.

If you would like copies for distribution to your staff or for your own ready reference, we have a limited number available for distribution at 10¢ each.

Just write:

Reader Service Department

AMERICAN MACHINIST

Magazine of Metalworking Production

330 W. 42nd STREET
NEW YORK 18, N. Y.

AMAZING TRANSTACKER — FAMOUS FOR CUTTING HANDLING COSTS IN HALF ADDS NEW *TILTING FEATURE*

For Faster, Safer Load Spotting and Cradling

This is the famous Automatic TRANSTACKER . . . the miracle truck of electric power that not only lifts and moves your material, but STACKS it to new heights . . . cutting handling costs as much as *one half*, and relieving labor from tedious back-breaking work.

Now, with its NEW TILTING TELESCOPIC UPRIGHTS, Transtacker makes load spotting easier and faster . . . and cradles the load for maximum protection to operator and merchandise. Manual handling is replaced by simple push-button moving and easy finger-tip operation of the lift and tilt controls . . . all electrically!

Light weight for use in buildings of limited floor and elevator capacities, with low initial cost, NEW TILTING TYPE TRANSTACKER is available in two models . . . single-lift and telescopic, with a single lift of 64 inches and a telescopic lift of 120 inches.

Both units are engineered to permit passage through seven-foot doors, and full use of otherwise unused storage facilities.

With the telescopic model, finger-tip control lifts a 28-inch, 3100-pound load, a 36-inch, 2600-pound load, or a 48-inch, 2100-pound load in a matter of seconds, thanks to Automatic's exclusive high pressure hydraulics. Performing at top efficiency on standard batteries and chargers, interchangeable with Automatic Transporters, battery charging cost is as little as 11c a day, and maintenance costs surprisingly low.

Find out now, the big competitive advantage Transtacker can give your business because of its original low investment and proved ability to cut handling costs. Mail coupon.

Transtacker
A PRODUCT OF AUTOMATIC
Lightens LIFE'S LOADS

AUTOMATIC TRANSPORTATION COMPANY
DIV. OF THE YALE & TOWNE MFG. CO.
59 West 87th Street, Dept. C-9, Chicago 20, Illinois

Please send me catalog and complete facts on new, low-priced TILTING TYPE TRANSTACKER.

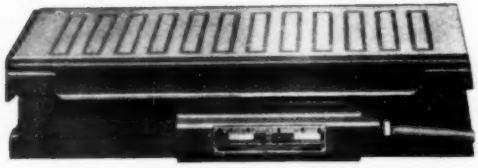
Company Name.....
By.....*Position*.....
Street Address.....
City.....*Zone*.....*State*.....

MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS AND SKYLIFT ELECTRIC TRUCKS

Difficult Set-ups are Easy

A difficult set-up that is easily handled on a Taft-Peirce Magnetic Chuck using magnetic parallels.

when you have the Super Holding Power of TAFT-PEIRCE *Superpower Magnetic Chucks*



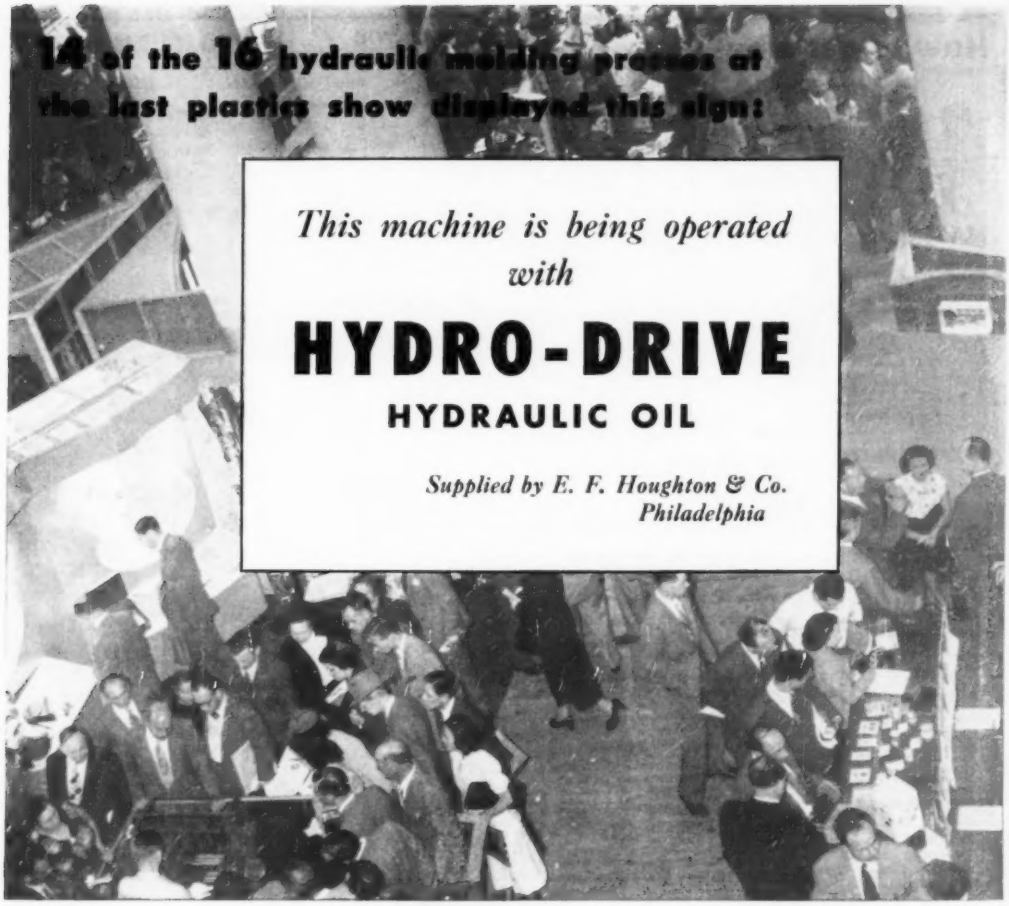
Size for size, Taft-Peirce Superpower Magnetic Chucks are magnetically more powerful than any other chuck.

They provide a positive unfailing grip of parts — greater safety, less spoilage. They make possible a wider range of set-ups. Their use can materially increase the versatility not only of grinders but of lathes, planers, millers, shapers and many other types of machine tools.

T-P Superpower Magnetic Chucks are available in every style; rectangular, rotary, or vertical face models; with plain, duplex, swivel, or tapered base. All have electrical parts sealed within the all-steel body; all are thoroughly shockproof and moistureproof.

If you have special applications, call your Taft-Peirce representative. He'll be glad to help. Frequently we can develop magnetic chucks with exclusive characteristics just for your job or problem.

THE TAFT-PEIRCE MFG. CO.
WOONSOCKET, RHODE ISLAND


14 of the 16 hydraulic molding presses at the last plastics show displayed this sign:
This machine is being operated with
HYDRO-DRIVE
HYDRAULIC OIL
Supplied by E. F. Houghton & Co. Philadelphia

This "fortified" oil assures freedom from gumming or oxidation . . . possesses high V.I.

Smooth operation of molding presses operated hydraulically was assured at the Plastics Show last September when Houghton supplied the hydraulic oil. Exhibitors appreciated the service, and the trouble-free results.

Men in plastics plants know this, because they've been using HYDRO-DRIVE regularly. They have come to realize how important a factor the oil medium can be, just as hydraulic engineers the country over appreciate what a *"fortified"* oil means to them.

Houghton was a leader in the treatment of hydraulic oils to inhibit them against early break-down, sludging tendencies or corrosive effect on metals. The Houghton Man would like to show you visual proof of the benefits you will receive from use of such fortified oils. Will you call him in?

E. F. HOUGHTON & CO.

Industrial Oils and Leathers

303 W. Lehigh Ave., Phila. 33

Services and sales in all principal cities

How to get a better paying machinist's job

Use the set of books that helps make MASTER MACHINISTS

HIGH-PAYING machinists' jobs are waiting for men who can handle them. Here's a sound guide that helps YOU fit into any one of these jobs. It gives you the practical knowledge of machine shop work that enables you to handle all kinds of jobs efficiently. You'll face work with confidence . . . plan and carry it out with better results . . . **you'll see advancements come your way.**

Shops throughout the country use this library. It answers questions on methods . . . the operation and repair of all types and sizes of machines for the range of metal cutting, forming and finishing operations.

TURNING AND BORING
Revised 3rd Edition
Gives you the essential principles involved in turning and boring operations . . . a clear picture of the kinds of machines in use and methods of operating them.

DRILLING AND SURFACING PRACTICE
Revised 3rd Edition
Up-to-the-minute information on drilling and surfacing tools, the machines in which they are used, and the methods of use which give best results.

THE MODERNIZED

AMERICAN MACHINISTS' LIBRARY

6 volumes, 2645 pages, 2747 illus.
Scores of charts and tables

GRINDING PRACTICE
Revised 2nd Edition
How to use the right machine and method for each operation. Valuable data on the use of diamond abrasive wheels for cutting-off work, complete details on speed, wheel selection, precision grinding, etc.

GEAR CUTTING PRACTICE
Revised 2nd Edition
Latest machines and methods for making gearing of different kinds and for checking accuracy. Includes standards adopted by the American Standards Association and by the American Gear Manufacturing Association.

PUNCHES AND DIES
Revised 3rd Edition
Outlines development of die design; discusses use of metal stampings for complicated constructions, sectional dies and big press work, blanking operations, use of cemented carbide dies, etc.

JIGS AND FIXTURES
Revised 5th Edition
Explains every aspect of the design and use of jigs and fixtures. Contains drawings of over 600 pieces available for adoption or adaptation. Emphasizes machines used, clamping methods, new standards for jig bushings, etc.

HERE'S the gist of more machine shop experience than you could amass in a lifetime of work . . . written by experts and made available in 6 compact volumes. You can check on your own methods, keep abreast of modern practices, solve problems right on the spot as they come up.

Guides You on All Types of Jobs

With this great guide, no job is too hard or unusual. The AMERICAN MACHINISTS' LIBRARY is so clearly and thoroughly indexed that you find in a jiffy answers to whatever problems may arise. With charts, diagrams, and pictures you're shown where to look for trouble . . . the characteristics . . . how to repair it . . . and the steps to take in order to keep machines operating smoothly and at top efficiency.

What this Library gives you:

—complete guide for everybody, from shop executive to apprentice interested in the operation of machines

—descriptions of all important varieties of machines, both manual and automatic, and methods of operating them

—essentials of selecting machines, setting up work, and handling operations in reaming, tapping, planing, shaping, slotting, milling and broaching, etc. etc.

NO MONEY DOWN

EASY PAYMENTS

See these books 10 days free. After 10 days return them or send $3.75 as the first installment and $4.00 monthly until $23.75 is paid.

See these books 10 Days Free

McGRAW-HILL BOOK CO., Inc., 330 W. 42d St., NYC 18

Send me the AMERICAN MACHINISTS' LIBRARY, 6 volumes, charges prepaid, for 10 days' examination. If I find the books satisfactory, I will send you $3.75 in 10 days, and $4.00 a month until a total of $23.75 has been paid. Otherwise, I will return the books postpaid.*

Name _____

Address _____

City _____ Zone ____ State _____

Company _____

Position _____ A-3-24-49

*We pay mailing costs if you send first payment with this coupon. Same return privilege.

BUZZER *Gas* FIRED FURNACES

2400° F. *Attainable Quickly Without Blower or Power*—just connect to your gas supply. Efficient and economical to operate. Temperatures easily controlled.

High Speed Full Muffle Furnaces designed for High Carbon and Alloy Steels. Also Semi-Muffle Furnaces for Low Carbon Steels, Preheating and Other Uses. Send for Catalog of Gas Furnaces, Burners, and other equipment.

CHARLES A. HONES, INC.
121 So. Grand Ave. Baldwin, L. I., N. Y.

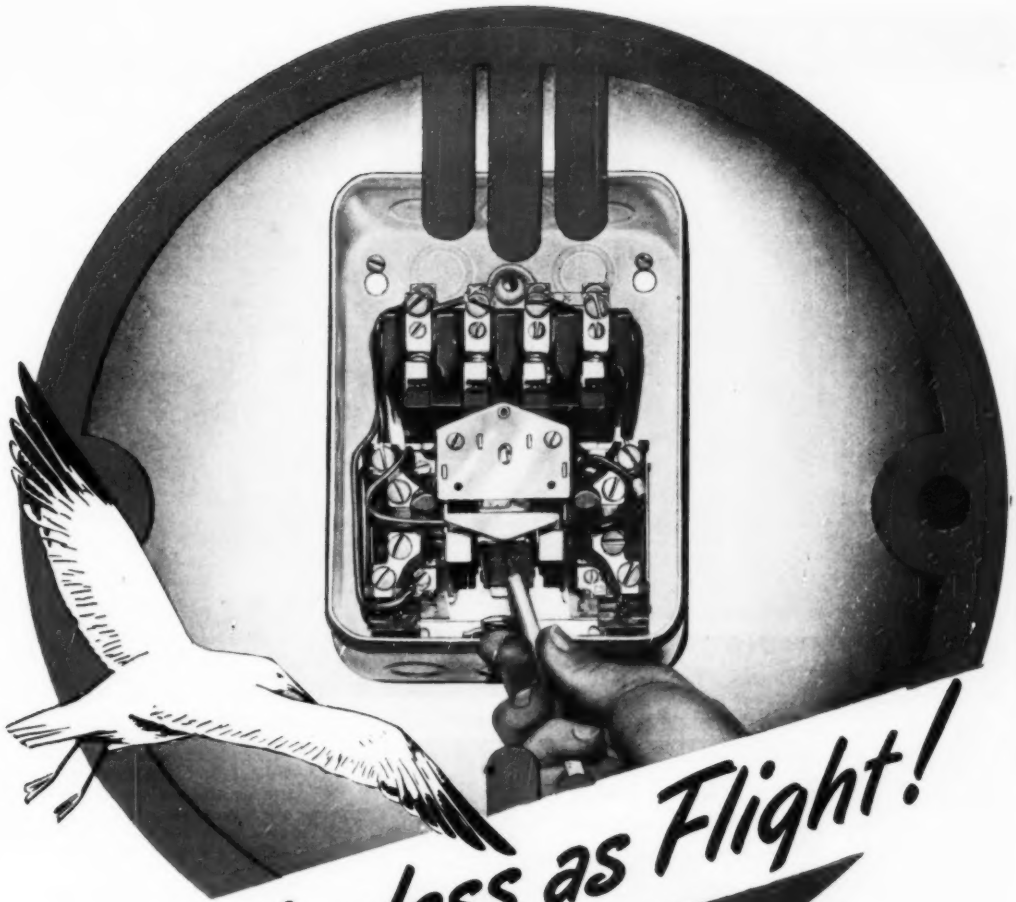
DIAMOND
Multi-Max Punch Presses

EXCEPTIONALLY LARGE BED AND RAM AREAS

CAPACITY 30 TONS

Write FOR COMPLETE CATALOG

DIAMOND MACHINE TOOL COMPANY
3419 EAST OLYMPIC BLVD., LOS ANGELES 23, CALIF.
OFFICE AND WAREHOUSE IN CHICAGO



Frictionless as Flight!

Only Federal Noark Motor Starters have free action . . .
the one moving unit floats on ball bearings

YOU DON'T SEE the ball bearings, but push up that moving unit and you *know* they're there. Only a featherlight touch is needed! And only Federal Noark Motor Starters give you that floating ball bearing action—with consequent longer and trouble-free service life.

But chalk up too, these additional advantages of Federal Starters! Their overload relays allow you the choice of automatic or manual reset by merely turning a knob. Coils are replaced in a matter of seconds. All parts are readily accessible from the front.

Order Federal Noark Motor Starters from your Federal Distributor and save time, effort and money. And write us for free copies of the "Federalog" and "Simplified Motor Control" giving full descriptions. Federal Electric Products Company, 50 Paris St., Newark 5, N. J.

FEDERAL NOARK
MOTOR STARTERS

Complete line of Federal Electric Products includes Motor Controls, Safety Switches, Service Equipment, Circuit Breakers, Panelboards, Switchboards, Control Centers, Bus Duct ★ Sales offices in principal cities.

ANTON PARALLELS

- **123 Sizes In Stock For *Immediate Delivery***
- **ANTON PARALLELS ARE HARDENED TO 65 ROCKWELL "C"**
- **ANTON PARALLELS ARE FULLY GUARANTEED to be within the following tolerances in height (ground surfaces):**

Grade	Height	Parallelism and Straightness Over Full Length
Standard	±.001"	±.0001"
Precision	±.0001"	±.0001"

LIST OF STOCK SIZES AND PRICES PER PAIR OF ANTON PARALLELS

Length In.	Width In. x Height In.	Standard	Precision	Length In.	Width In. x Height In.	Standard	Precision	Length In.	Width In. x Height In.	Standard	Precision
6	1/4x 3/8	$4.36	$5.67	6	1/4x1- 3/4	$4.36	$5.67	6	1/2x1- 3/4	$6.50	$8.45
6	1/4x 7/16	4.36	5.67	6	1/4x1-13/16	4.36	5.67	6	1/2x1-13/16	6.50	8.45
6	1/4x 1/2	4.36	5.67	6	1/2x 1/2	6.50	8.45	6	3/4x1- 3/16	8.07	10.49
6	1/4x 9/16	4.36	5.67	6	1/2x 9/16	6.50	8.45	6	3/4x1- 1/4	8.07	10.49
6	1/4x 5/8	4.36	5.67	6	1/2x 5/8	6.50	8.45	6	3/4x1- 5/16	8.07	10.49
6	1/4x 11/16	4.36	5.67	6	1/2x 11/16	6.50	8.45	6	3/4x1- 3/8	8.07	10.49
6	1/4x 3/4	4.36	5.67	6	1/2x 3/4	6.50	8.45	6	3/4x1- 7/16	8.07	10.49
6	1/4x 13/16	4.36	5.67	6	1/2x 13/16	6.50	8.45	6	3/4x1- 1/2	8.07	10.49
6	1/4x 7/8	4.36	5.67	6	1/2x 7/8	6.50	8.45	6	3/4x1- 9/16	8.07	10.49
6	1/4x 15/16	4.36	5.67	6	1/2x 15/16	6.50	8.45	6	3/4x1- 5/8	8.07	10.49
6	1/4x1	4.36	5.67	6	1/2x1	6.50	8.45	6	3/4x1-11/16	8.07	10.49
6	1/4x1- 1/16	4.36	5.67	6	1/2x1- 1/16	6.50	8.45	6	3/4x1- 3/4	8.07	10.49
6	1/4x1- 1/8	4.36	5.67	6	1/2x1- 1/8	6.50	8.45	6	3/4x1-13/16	8.07	10.49
6	1/4x1- 3/16	4.36	5.67	6	1/2x1- 3/16	6.50	8.45	9	1 1/4x2		
6	1/4x1- 1/4	4.36	5.67	6	1/2x1- 1/4	6.50	8.45	9	1 1/4x2- 1/4		
6	1/4x1- 5/16	4.36	5.67	6	1/2x1- 5/16	6.50	8.45	*MAGNETIC CHUCK PARALLELS (Standard)			
6	1/4x1- 3/8	4.36	5.67	6	1/2x1- 3/8	6.50	8.45	6	1/4x 1/2	PRICES FURNISHED ON REQUEST	
6	1/4x1- 7/16	4.36	5.67	6	1/2x1- 7/16	6.50	8.45	6	1/4x1-13/16		
6	1/4x1- 1/2	4.36	5.67	6	1/2x1- 1/2	6.50	8.45	6	1/2x1- 1/2		
6	1/4x1- 9/16	4.36	5.67	6	1/2x1- 9/16	6.50	8.45	6	3/4x1- 1/4		
6	1/4x1- 5/8	4.36	5.67	6	1/2x1- 5/8	6.50	8.45	9	2 1/4x3		
6	1/4x1-11/16	4.36	5.67	6	1/2x1-11/16	6.50	8.45				

PRICES ON COMPLETE SETS OF PARALLELS
(In a Neat Wooden Container)

	1/4" Th. x 6" L. (22 Pairs)	1/2" Th. x 6" L. (11 Pairs)	3/4" Th. x 6" L. (11 Pairs)
	1/2" to 1-13/16" High Inclusive by 1/16"	1/2" to 1-1/8" and 1-3/16" to 1-13/16" High Inclusive by 1/16"	1-3/16" to 1-13/16" High Inclusive by 1/16"
STANDARD	$96.00	$71.00	$88.75
PRECISION	124.80	92.00	115.00

All Prices are F.O.B. New York

ANTON MACHINE WORKS
52 Sands St., Brooklyn 1, N. Y. Tel. TRiangle 5-8092

A press brake equipped with Wittek No. 6-L Automatic Roll Feed

You Can't Beat WITTEK

Wittek Roll Feeds are made in standard models to meet every requirement in the automatic feeding of strip stock to punch presses or press brakes. The distinguishing feature is their simple and economical method of operation which does away with complicated parts thereby assuring *speed* and *accuracy* in the feeding of various kinds and thicknesses of material.

Wittek Adjustable Reel Stands are designed as companion units to Wittek Automatic Roll Feeds and are available in seven different models to handle *ALL* types of coiled strip stock and wire being fed to punch presses or similar production machinery.

Special units of Wittek Automatic Roll Feeds and Adjustable Reel Stands are engineered to meet unusual requirements.

Write for complete descriptive literature

WITTEK Manufacturing Co.
4320 W. 24th Place
Chicago 23, Ill.

Automatic ROLL FEEDS AND REEL STANDS

Here's help

for shops machining stainless steel

THE increasing use of stainless steel is presenting new machining problems to many shops. D. A. Stuart Oil Co. has collected much valuable information on this subject from long experience and is particularly well qualified to assist the industry. For example: a Wisconsin plant had tried a wide variety of oils for tapping Type 310 stainless and was still getting but 50 holes per tap. With Stuart's ThredKut 99, used straight, they had secured 550 holes with one tap. In another plant, a Type 304 stainless steel union being made on a Cleveland Automatic was a slow and unprofitable job. A change to a 6 to 1 blend of Stuart's ThredKut 99 increased output from 18 to 31 pieces per hour and this is now one of the more profitable jobs in the shop.

These results are not exceptions, nor does D. A. Stuart profess to work miracles. It is simply that study plus trial and error on thousands of stainless steel machining jobs has given the company a worthwhile fund of knowledge on the subject. This experience and information is available to anyone interested in getting better finishes, longer tool life or faster production on stainless. For further information write, or call a D. A. Stuart representative.

STUART *service goes with every barrel*

D.A. Stuart Oil Co.

2729 S. Troy Street, Chicago 23, Illinois

THEY MAY LOOK ALIKE . . . *but there's a difference!*

Both strings of pearls may look alike to the camera's eye, but one is of matched Orientals . . . the other is a clever imitation. Actual comparison by an expert will show a vast difference in quality and value.

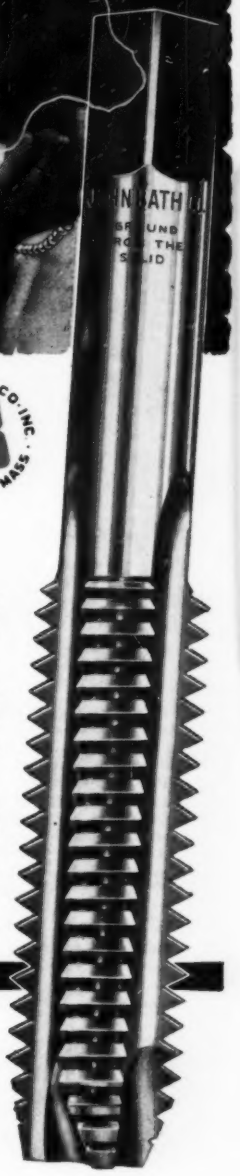
JOHN BATH CO. INC. · WORCESTER · MASS. · B

THERE IS A DIFFERENCE IN TAPS, TOO!

While all taps may look alike at first glance, the outstanding quality and plus-value of BATH ground thread taps are quickly evident to the experienced eye of the craftsman.

BATH taps are ground from the solid AFTER hardening, guaranteeing UNIFORMITY and ACCURACY. Made in stock and special sizes for use in working any material or metal. There's a BATH tap for cutting *every kind of thread.*

Perhaps you're using a set of 2 or 3 taps where a BATH Acme thread tap will do the work in a single pass! Remember — trained BATH engineers have access to design and production records of hundreds of problems in every possible type of work. BATH representatives are ready to assist you...or write direct about your problem.



INSIST ON BATH TAPS . . . PROFIT BY THEIR PLUS PERFORMANCE!

PLUG AND RING THREAD GAGES · GROUND THREAD TAPS · INTERNAL MICROMETERS

JOHN BATH CO. INCORPORATED

22 Grafton St., Worcester, Mass.

IT'S A

Mac-it®

PRONOUNCED "MACK-IT"

Mac-it Hollow Pipe Plugs — for accuracy, safety, uniformity and strength.

BETTER, FASTER SERVICE WITH THIS *COMPLETE* MAC-IT LINE!

Because many standard types of Mac-its are stocked throughout the country for quick delivery, and because specials can be engineered to your own specifications, you'll find it pays to investigate Mac-its *first.*

Mac-it's 35 years' experience in the manufacture of heat-treated, alloy steel screws is your assurance of precision, uniformity and strength. Sold through leading industrial distributors from coast to coast and in Canada. Write for new catalog today!

Other Mac-it products include:

Hollow Lock Screws	Socket Screw Keys
Socket Head Cap Screws	Square Head Set Screws
Hollow Set Screws	Hexagon Head Cap Screws
Stripper Bolts	. . . and many others

Marketed Nationally Since 1913 by

STRONG, CARLISLE & HAMMOND COMPANY

Cleveland 13, Ohio

Manufactured by MAC-IT PARTS COMPANY, Lancaster, Pa.

–this is worth buying!

WHEN you order Oakite Composition No. 97 for machine precleaning of metals—*or* Oakite Composition No. 24 for tank cleaning *or* Oakite Composition No. 90 for electrocleaning *or* Oakite CrysCoat No. 87 for pre-paint treatment—you buy a lot more than a good solvent or alkaline or acidic material.

What you actually buy is *Oakite service,* which combines the skill of Oakite engineers and chemists with the experience of more than 150 Oakite Technical Service Representatives working for tens of thousands of customers every year.

To discover what *Oakite service* means, call the Oakite Technical Service Representative in your vicinity or write to Oakite Products, Inc., 24 Thames St., New York 6, N. Y.

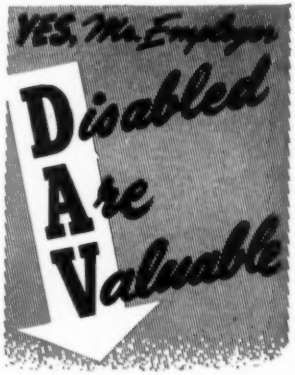
OAKITE 1909 1949 40th ANNIVERSARY YEAR

OAKITE

REG. U. S. PAT. OFF.

INDUSTRIAL CLEANING MATERIALS • METHODS • SERVICE

Technical Service Representatives Located in Principal Cities of United States and Canada



IT'S GOOD BUSINESS TO EMPLOY DISABLED VETERANS

NATIONAL HEADQUARTERS—Cincinnati, Ohio

DAVIS KEYSEATER

This low cost machine will handle internal keyseating jobs up to 1¼ in.

Write for illustrated bulletin.

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

One of the many ways that

industry makes multiple savings with Gulf Quality Oils and Greases:

Artist's drawing of 1,000-ton oil-hydraulic press in a large Middle Western manufacturing plant. The hydraulic system is protected against corrosion and sludge deposits by the use of Gulf Harmony Oil.

GULF HARMONY OIL

insures better performance of oil-hydraulic equipment, prevents corrosion

Today practically every industry is making greater use of versatile oil-hydraulic power to drive and control production equipment.

A vital factor in oil-hydraulic machine operation is the selection of the proper hydraulic oil. Gulf Harmony Oil meets the most exacting requirements for this type of equipment. It provides outstanding protection against wear of all types of rotary pumps, cylinders, and control mechanisms, and keeps leakage to a minimum.

Highly resistant to oxidation and emulsification, Gulf Harmony Oil lasts indefinitely and resists formation of harmful sludge deposits — insures freedom from jerky feeds, chattering, and loss of accuracy. In the many plants where this quality oil is used, there is tangible evidence of better hydraulic equipment performance, less out-of-service time, fewer part replacements, and lower maintenance costs.

Gulf Harmony Oil is one of more than 400 Gulf quality oils and greases that are helping plant operating men make multiple savings through improved production and lower costs. Make sure your plant is getting the advantage of all recent developments in petroleum science. Write, wire, or phone your nearest Gulf office today and ask a Gulf Lubrication Engineer to call.

Gulf Oil Corporation · Gulf Refining Company

Division Sales Offices:

Boston · New York · Philadelphia · Pittsburgh · Atlanta
New Orleans · Houston · Louisville · Toledo

GULF INDUSTRIAL LUBRICATION

Helps make machines produce more at lower cost

TRY US FIRST

when you need Stainless Steel

Are you looking for Stainless? Then you'll be glad to learn that our stocks include: No. 2B Finish Sheets "par-excellence"; No. 4 Finish Sheets of uniform quality; bars meeting high standards of machinability; plates up to 120" wide and 360" long; welded and seamless tubing, pipe, angles, channels, welding electrodes in all standard grades and specifications.

Moreover, you can't beat U·S·S Stainless Steel for quality and proven excellence. And you'll get prompt, courteous service.

Fill in and mail the coupon —now—for free booklets on U·S·S Stainless Steel.

UNITED STATES STEEL SUPPLY COMPANY · USS STEELS · SERVICE

SYMBOL OF SERVICE FOR STEEL USERS

United States Steel Supply Company
Dept. EE-39, 208 S. La Salle St., Chicago 4, Ill.

Without obligation on our part, please send us free booklets on U·S·S Stainless Steel as checked below.

☐ Fabrication Book ☐ Food Handling and Processing ☐ Petroleum Industry

Name..... Title.....

Firm Name.....

Address.....

City..... Zone..... State.....

UNITED STATES STEEL SUPPLY COMPANY

Warehouses: BALTIMORE · BOSTON · CHICAGO · CLEVELAND · LOS ANGELES MILWAUKEE · MOLINE, ILL. · NEWARK · PITTSBURGH · PORTLAND, ORE. SAN FRANCISCO · SEATTLE · ST. LOUIS · TWIN CITY (ST. PAUL) Also Sales Offices at: KANSAS CITY · PHILADELPHIA · TOLEDO TULSA · YOUNGSTOWN

Headquarters Offices at: 208 S. La Salle St.—Chicago 4, Ill.

UNITED STATES STEEL

STA·KOOL Diamond Dresser

Tool life, speed of cut, increased production, depend upon the diamond tool. The patented STA-KOOL is provided with water ducts for wet-grinding and cooling fins for dry-grinding, thus keeping stone and setting at safe operating temperatures. STA-KOOL Tools last longer and cut costs from 30 to 50%. Catalog on request.

J. K. SMIT & SONS, INC.
157 CHAMBERS ST., NEW YORK 7, N. Y.
Factory: Murray Hill, N. J.
6400 Tireman Ave., Detroit 4, Mich.
In Canada: 129 Adelaide St. West, Toronto, Ont.

SHIPPERS report savings of $600 a year with Marsh Stencil Machines, Brushes, Inks! Electric and Hand Operated machines cut ½", ¾", 1" letters. For sample stencil, Shippers' Handbook, prices, pin this to business letterhead with your name.

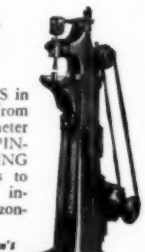
MARSH STENCIL MACHINE CO.
40 Marsh Bldg. · Belleville 10, U. S. A.

MARSH STENCIL MARKING

GRANT

RIVETERS — PIONEERS in their line—head rivets from smallest to ⅝" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

Write for literature and don't forget to send samples.



THE GRANT MFG. & MACHINE CO.
85 Silliman Ave., Bridgeport, Conn., U. S. A.

Mill and drill in the same chucking

Two high production drilling and tapping machines use a new 5 hp milling attachment

In one chucking of the housing 5 tools operate. One tool is a TC-tipped milling cutter, 5.5 in diam. It cuts at the rate of 1.9 cu. in. per min.

In 2 chuckings of the throttle body 31 tools operate. Two tools on the same arbor are TC-tipped milling cutters. A 2 in. cutter mills one boss in the second chucking. A 2.5 in. cutter mills 2 bosses in the first chucking.

The principle is not new. For years we have used milling attachments on drilling units with ½ to 3 hp motors.

But the milling attachment on these 2 machines is new. It is so heavy and rugged it needs 2.2500 diam. guide rods. (Our other attachments use 1.0000 or 1.3750 diam. rods.) It usually takes a 5 hp motor. Both jobs here are well within its capacity.

With this 5 hp milling attachment you can mill fairly heavy cuts in the same chucking with drilling, reaming, tapping and other operations. You can finish the part in fewer chuckings. You know the benefits of fewer chuckings —

More output per man hour
Accurate relationship of operations
Less handling and less floor space
Result: better product at lower cost

Unit costs in pennies

Man and machine cost 9/10¢ for all 5 operations on the housing. Man and machine cost 4-6/10¢ for all 31 operations on the throttle body. Here is the basis: 1) 80% efficiency, 2) the machine to pay for itself after operating only 6000 hours, a fraction of its useful life, 3) the present national average wage rate. No power or overhead.

Speaking of low costs, that reminds us of a story. One of our dealers called us the other day. "About our order so-and-so for a new Kingsbury," he said. "They are putting on the heat for a better delivery. Until they get that new machine, they say it costs them 10¢ too much to build each car."

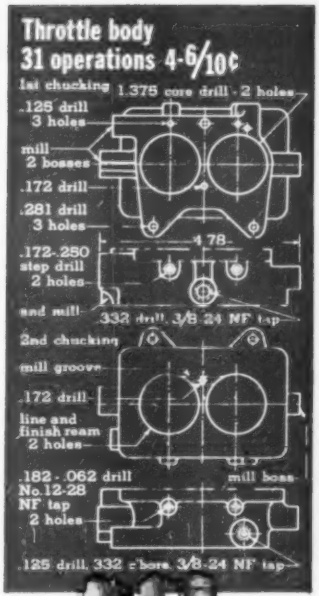
Our sales manager told this 4 times before he reached the "expediter."

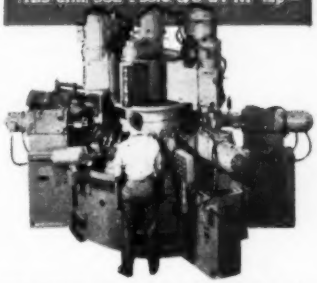
Do your parts cost too much?

When you look for automatic machines to cut your costs, may we quote too? Send a print to our Mr. L. A. Carll. Tell him the operations and hourly output you need. We believe our proposal will merit your consideration.

Sincerely yours,

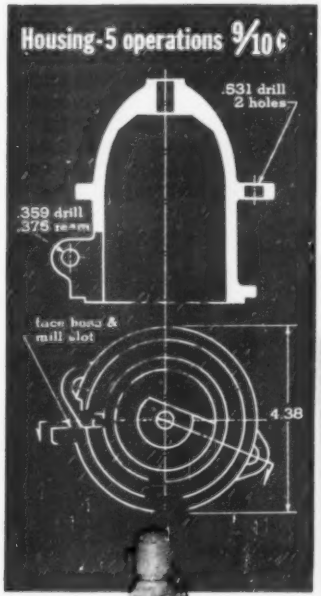
Kingsbury Machine Tool Corp.
50 Laurel St., Keene, N. H.





302 PARTS AN HOUR GROSS. On this 60-inch automatic indexing machine, 16 units do 31 operations on 4 sides of the throttle body in 2 chuckings.

- **On the central column are 10 vertical units. Only 8 show. After we made the photo the owner needed 2 more operations. We installed 2 units in the space we provided on the front of the column.**
- **Knees attached to the base support 6 horizontal units. (Originally 5 units: one more added later for a new operation.)**
- **A power wrench opens and closes the fixtures. (The man stepped aside so you could see it. That is why he does not look busy.)**
- **Ball bearing bushings guide the 1.375 core drills and line reamers. Regular bushings in piloted carriers guide the 13 other drills.**



538 PARTS AN HOUR GROSS: You would never guess it from this picture but the cycle is only 5.5 seconds. During this time the man is supposed to remove a finished part and replace it.

- **Operations are from 3 directions — Vertical: A unit with 2-spindle auxiliary head drills the two .531 holes. Horizontal, 45° left of the radial line: A unit with the new 5 hp milling attachment faces the boss and mills the slot with the same cutter. Horizontal, 45° right of the radial line: 2 units drill .359 and ream .375. (A bushing guides the drill.)**
- **The indexing table is 20 inches in diameter and holds 4 duplicate work fixtures.**

KINGSBURY

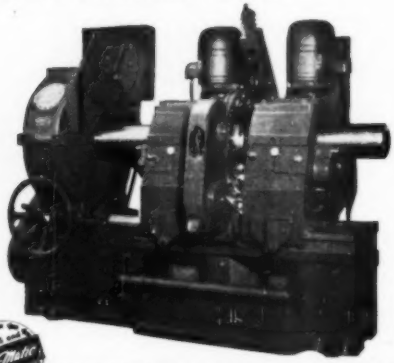
AUTOMATIC DRILLING
AND TAPPING MACHINES
for Low-Cost High Production

Roto 1-A Matic

HORIZONTAL PRODUCTION MILLERS

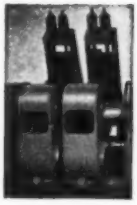
FEATURING

1 CONTINUOUS OPERATION
2 AUTOMATIC CHAIN CLAMPING
3 ROUGH & FINISH CUTTERS — EACH HEAD
4 3 TYPES — VARYING BED LENGTHS
5 LOW MAINTENANCE COST
6 INTERCHANGEABLE FIXTURES



INDEPENDENTLY DRIVEN HEADS

No. 1-A ROTO-MATIC Millers have been produced for the past 30 years in various sizes and types to do specific jobs faster and better than they have ever been done before. Because of their flexibility they have been designed to take a wide range of work with uniform satisfactory results. Engineering has made possible the milling of several work pieces at one time giving a high production of each. In all cases exacting requirements as to quality of work have been met.



Chain Clamping Fixture for rough and finish milling both ends of Control Arm Trunions to length. Interchangeable buttons make possible the milling of several sizes — Production 296 gross per hour.

Double Chain Clamping Fixture with a total of 28 stations for milling ends of Clutch Gears — Production 200 gross per hour — With this arrangement two different parts can be milled simultaneously.

Double Drum — 50 automatic holding fixtures on each drum for rough and finish milling radius on Rocker Arms — Production 1400 gross per hour.

ASK FOR BULLETIN 121

DAVIS and THOMPSON CO.
MANUFACTURERS OF *Machine Tools*
MILWAUKEE 14, WISCONSIN

Investigate ---

CHUCKING

with the SPEED of ELECTRICITY

MAGNA-LOCK LAMINATED CHUCKS
Two types, STANDARD and the ultra-powerful SUPREME — both with all steel laminated top plates — patented hermeti-coil waterproof construction. MAGNA-LOCK chucks give you 22% more working surface—uniform, pull — sizes from 4x9" to 30x96". And ask about special chucks, top plates, parallels and V-blocks.

NEUTROFIER
For faster, more efficient magnetic chucking—this new combination Rectifier and Demagnetizer will help you lower production costs.

Let Laminated MAGNETIC CHUCKS by Hanchett Set New Production Standards for You.

The Hanchett magnetic chucking method lifts the limit off production speeds for small parts finishing. Check your shop for machining operations where chucking and set-up time cuts into profits. Find out whether completely automatic "hands-off" production would boost your net. Then drop us a card. We'll help you apply Hanchett Magnetic Chucking to your grinding, milling, drilling, shaping operations. . . .

ASK FOR BULLETIN A-69

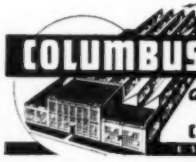
HANCHETT HERMETI-COIL

HANCHETT MAGNA-LOCK CORP.
Magnetic Chucks and Devices
BIG RAPIDS MICHIGAN

ACCURACY
Efficiency
Economy

These three factors are the key-note of our special tools and machinery. Columbus Die-Tool builds and designs the tool for your particular purpose and will solve the toughest tooling problems effectively and promptly. Do not hesitate to consult us, our experience in this field is most comprehensive.

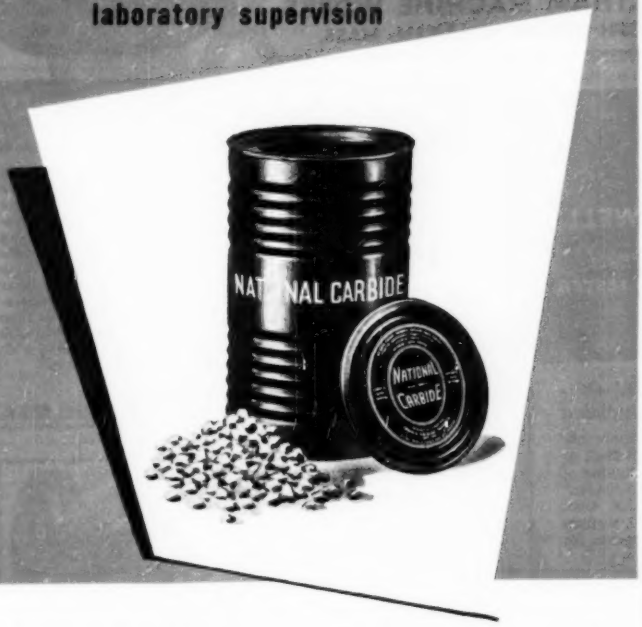
JIGS • FIXTURES • SPECIAL TOOLS
BUILDING COMPLETE MACHINE TOOLS
UNITS FOR MACHINE TOOLS
PUNCHES AND DIES



COLUMBUS DIE·TOOL
and Machine Co.
935 CLEVELAND AVE.
COLUMBUS 1 OHIO
ESTABLISHED 1906

For high acetylene yield . . . specify National Carbide

produced under laboratory supervision



Rigidly controlled and tested during manufacture . . . and produced from the finest lime and coke available, "*National Carbide*" (meeting all Federal Specifications) assures every customer an exceptionally high acetylene yield per pound of carbide — a minimum 4½ cu. ft. This high quality, plus careful adherence to a special packaging technique accounts for "*National's*" wide acceptance as the Carbide producing maximum acetylene production . . . at lowest operating cost.

Also, and of vital importance to you, no matter where your plant is located, "*National Carbide*" can be obtained in any quantity from a nearby Airco office, authorized dealer, or warehouse.

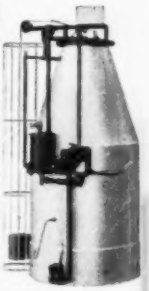
For more information about this top-grade product, write your name and address on the margin below, and send it to your nearest Airco office or authorized dealer for a copy of Catalog 30.

★ ★ ★

Air Reduction supplies Oxygen, Acetylene and other industrial gases . . . Carbide . . . and a complete line of gas cutting machines, gas welding apparatus and supplies, plus arc welders, electrodes and accessories. Ask us about anything pertaining to gas welding and cutting, and arc welding . . . we'll be glad to help you.

More news about AIRCO products

STATIONARY ACETYLENE GENERATORS



Airco's 300 pound (double rated — 600 cu. ft. per hr.) and 500 pound (double rated — 1,000 cu. ft. per hr.) stationary acetylene generators are suitable for operating all types of welding or cutting torches.

Automatic in principle, these generators feature hot galvanized shells — inside and out, with all welded seams. Operating parts have been reduced to a minimum — and are easily accessible for inspection or repair.

Also included as standard equipment are "protectomotor filters" to entrap suspended lime, and prevent clogging acetylene pipe lines, regulators and torches.

PORTABLE ACETYLENE GENERATORS

The Airco Type "P" portable actylene generator is designed and constructed for efficiency, convenience, dependable and low-cost operation . . . and requires little attention other than draining and refilling with carbide and fresh water. Other features include:

- **Quick, easy charging**
- **"Air Lift" principle of water circulation**
- **Glass viewing window in carbide hopper**
- **Simple and conveniently located controls**
- **Large-size sludge agitator and valve for complete and fast sludge removal.**

Made in three sizes, each approved for double-rated operation: 15-lb. size, 30 cu. ft. per hr.; 30-lb. size, 60 cu. ft. per hr.; and 50-lb. size, 100 cu. ft. per hr.

All Airco generators conform with the specifications of Underwriters' Laboratories and Factory Mutual.

AIRCO **AIR REDUCTION**

Offices in Principal Cities

WALTHAM SUB-PRESSES...

...for precision work

Arch Sub-Press

The cylindrical plungers in the Waltham Sub-presses slide in babbitted bearings. This bearing is tapered on the outside and can be forced downwards, thus reducing the inside diameter to fit the plunger when the latter becomes worn through use. Exact alignment and constant precision can be maintained throughout the life of the die. Write for information about the nine sizes.

Overhang Sub-Press

WALTHAM MACHINE WORKS
HIGH STREET, WALTHAM, MASS.

. . . with many uses, but only one standard of precision

• For research, supervision or control—in laboratory, toolroom or production line—tests made by the "ROCKWELL" Superficial are as representative of hardness as those made on the regular "ROCKWELL" Hardness Tester. Only requirement is that, since depth of indentation is only .005" or less, surfaces must be smooth and materials homogeneous for general testing.

This instrument is especially suitable for testing very thin materia, nitrided or lightly carburized steel and areas too small for regular "ROCKWELL" Hardness Tests. A Wilson Field Service Engineer will be glad to discuss with you whether or not a "ROCKWELL" Superficial Hardness Tester will best serve your needs.

WILSON
MECHANICAL INSTRUMENT CO., INC.
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.

ACCO

230-B PARK AVENUE, NEW YORK 17, N. Y.

Any MICROMETER 1" to 18" size trued and lapped square

Patented

Pearson Precision "Micrometer Lapping Fixture" gives your plant constant *exact check* on all micrometers. Any good toolroom man can operate it expertly. No disassembling of micrometer other than removing spindle. Laps micrometer in exact right angle with center line of spindle; and in perfect alignment with end of micrometer spindle. Also makes an excellent comparator. Saving an hour's rejects may more than pay for this fixture. "This fixture will also accurately lap adjusting snap gauges with addition of a new holding bracket."

Write for Literature
MANUFACTURED BY RED WING MOTOR CO., RED WING, MINN.

STRAIGHT SIDE SINGLE CRANK PRESSES
for heavy blanking and forming

Heavier classes of blanking and forming work can be handled efficiently and economically on these presses.

Sturdily constructed with either solid frame or built up with tie rods. Small elastic deflections do not affect tool alignment. All stresses taken centrally. Made also with wedge adjustment for slide for very close work.

Full details on request.

Straight Side Press

ZEH & HAHNEMANN CO.
NEWARK N. J.
180 Vanderpool Street

"Anti-friction Bearings Throughout"

CARLTON RADIAL DRILL

FEATURES: 1. Low Hung Drive to Spindle. 2. All Power Driven Parts Running in Oil. 3. Quiet Running at All Speeds. 4. Concentrated and Convenient Push-Button Controls. 5. Construction Unit Principle.

THE CARLTON MACHINE TOOL COMPANY
CINCINNATI 25, OHIO, U. S. A.

Speedy Accurate Milling Saves Labor!

On countless jobs—Kent-Owens Milling Machines have shown ability to turn out work with top speed and high accuracy. They're designed for rapid, easy set-up and operation. Rugged . . . with twin-post head mounting that assures balanced load—no chattering. Practical features throughout to help you *produce more* . . . with *lower costs!* Write for bulletins on the Kent-Owens Standard line . . . including wide range of hydraulic and hand operated machines. Also, let our engineers help you with tooling and special machine requirements.

Kent-Owens Machine Co., Toledo, Ohio.

No. 2-20 . . . 20" table travel . . . 42" x 12" table . . . full automatic hydraulic feed.

No. 2-20 DS . . . Double Spindle for two milling operations . . . 20" table travel . . . 42"x12" table. Hydraulic feed.

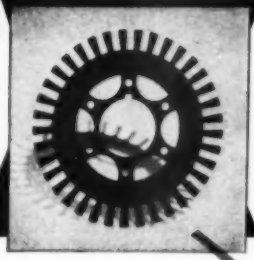
No. 2-20V . . . 20" table travel . . . vertical spindle with speed range 32 to 1284 R.P.M. . . . 42"x12" table. Hydraulic feed.

Call on

KENT-OWENS

For Milling Machines

DIE MAKER SAVED 40 HOURS on the die job for this part



CUSTOMER GAINED 375,000 ADDITIONAL PIECES

Armature lamination of silicon steel was punched out in a single crack in a hand fed press. Lempco equipped dies yielded 375,000 extra pieces over conventional die sets.

Die maker also saved forty hours in die assembly and tryout over previous record due wholly to precision of pre-loaded ball bearing bushing of Lempco Die Sets.

DIE MAKER Saves Time in Assembly

PRESS OPERATOR Gets More Pieces Per Grind

by Using **LEMPCO Anti-Friction Die Sets**

Here are some comments by users who have standardized on Lempco.

"... clearances of .001" or under demand Lempco die sets as few *standard* die sets will provide that precision without die maker and press operator risking time losses in aligning punches and press stoppages."

"... press capacity that exceeds 200 strokes a minute requires Lempco die sets as only specially finished pins and bushings can be used with assurance at higher speeds.

"... if die overhang is large, accurate closing at extremities is always questionable unless a pre-load bearing bushing is used."

"... costly dies and particularly carbide dies require the protection provided by the precision fit of Lempco die sets."

A new brochure "Factors in Specifying Die Sets" is in production. Write for your copy. Address: LEMPCO, 5500 Dunham Road, Bedford, Ohio.

LEMPCO
ANTI-FRICTION DIE SETS

5500 DUNHAM RD.
BEDFORD, OHIO

More men pay to read American Machinist than any other metalworking publication—by many thousands.

F-15A

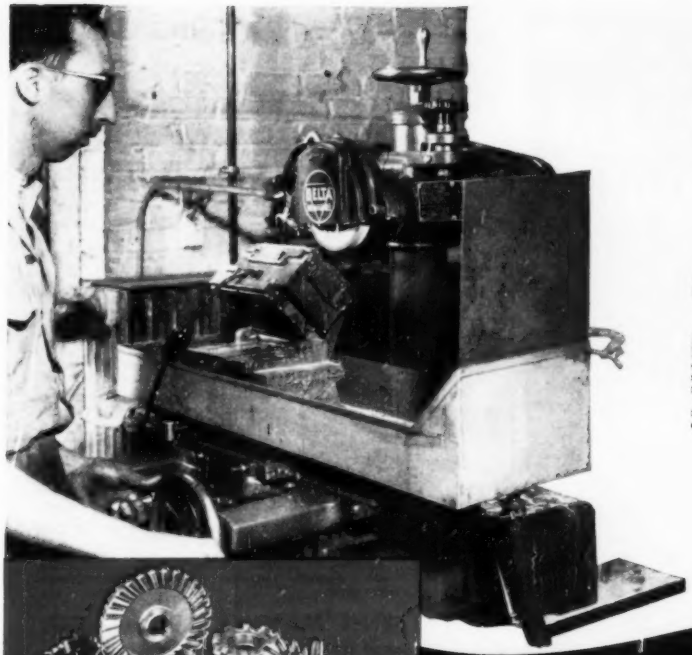
HERE'S A

Parade

YOU WON'T WANT TO MISS...

Everybody loves a parade but here's one that's particularly interesting to YOU because it's packed with "pocket-book" appeal. It's a never-ending parade of products and services designed to help you do *your* job better, quicker and cheaper. You're in the "reviewing stand" for this parade because it comes to you in the advertising pages of every issue of this magazine. Alert manufacturers use these advertising pages to get the *news* about their products and services to *you*... quickly and effectively. To be well-informed about the latest developments in *your* industry... and to stay well-informed... *read all the ads too.*

American Machinist



DELTA MILWAUKEE ®

Delta Toolmaker† Surface Grinder

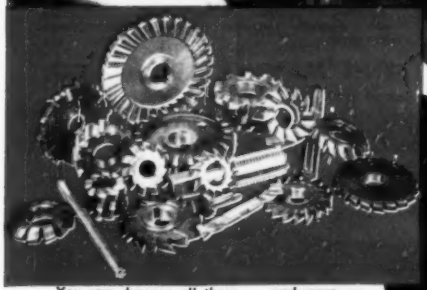
Shown at left working on a lathe bit. Has wide graduations on micrometer, for close settings. Unique wheel adapter saves time and redressing. Many other features. 7" x ½" wheel, 1¼" bore.

With simple attachments, this versatile machine becomes an efficient tool-and-cutter grinder or a chip-breaker grinder.

No. 24-105

$375*

without wheel, motor, or switch.



You can sharpen all these — and more — with Delta grinders.

These DELTA® machines cut grinding costs for toolroom and production work

Delta Grinder with Twin-Lite† Safety Shields — Twin-Lite Safety Shields act as "built-in goggles," flooding your work with light. Fully-machined tool rests. Balanced wheels. Lubricated-for-life ball bearings. **No. 23-405** — Complete with safety shields, lamp bulbs, wheel guards, and wheels. - - - - - - - - - - $114*

Delta Carbide Tool Grinder — Combined with Delta's standard tool grinder for hogging down the shank steel, this machine gives you a perfect working combination for sharpening tungsten carbide tools. **No. 23-555** — Complete with lamp attachment, water pot, and wheels - - - - $154*

You would expect to pay much more for the all-around high quality you find in these low-cost Delta grinders. Delta's advanced engineering helps make industrial grinding easier, cheaper, and extremely accurate. Plant owners, superintendents, and engineers everywhere can tell you that.

Delta grinders are available in both bench and floor models—with current and speeds to suit any requirement. Simple, easily-adjusted attachments increase the utility of these machines.

Your nearby Delta distributor has these popular grinders on display now. Inspect them there. Ask about buying on easy credit terms.

DELTA MANUFACTURING DIVISION
ROCKWELL MANUFACTURING COMPANY
MILWAUKEE 1, WISCONSIN

Look for the name of your Delta distributor under "Tools" in the classified section of your telephone directory.

Unihead† — A universally-adjustable work head, designed for use in connection with Delta Toolmaker Cutter Grinder. See details in catalog A-48.

Univise†—The first truly universal vise for grinding, drilling, and milling. With coolant attachment, converts Delta Toolmaker Surface Grinder to accurate Chip-Breaker Grinder. See details in Delta catalog A-48.

TEAR OUT COUPON AND MAIL TODAY!

DELTA MANUFACTURING DIVISION
6080 E. Vienna Ave., Milwaukee 1, Wis.
Send me free copy of Delta Catalog A-48.

Name.....
Title.....
Company.....
Address.....
City.....( ) State.....

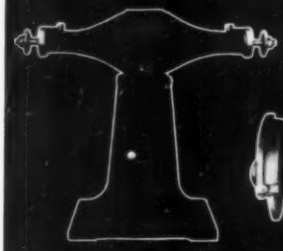
M-36

The Cincinnati.... TRADE MARK TRADITIONALLY FINE TOOLS!

ELECTRIC DRILLS
¼" TO 1½"

GRINDERS—½ TO 15 H. P.

PORTABLE GRINDERS—5", 6", AND 8" WHEEL CAPACITIES



BUFFERS
½ TO 15 H. P.

TOOL POST GRINDERS
¼ TO 1 H. P.

MANUFACTURERS OF

Electric Drills
Screw Drivers
Nut Setters
Tappers
Routers
Portable Grinders
Tool Post Grinders
Speed Lathes
Bench and Pedestal Grinders
Bench and Pedestal Buffers
Abrasive Cut-off Machines
Air Master Dust Collectors

TRADE The Cincinnati MARK

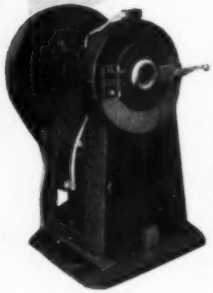
THE CINCINNATI ELECTRICAL TOOL CO.

Division of THE R. K. LeBLOND MACHINE TOOL CO.

2615 MADISON ROAD • CINCINNATI 8, OHIO

SAVE TIME SAVE MATERIAL

WITH "Standard" SWAGING MACHINES by FENN



SHAPE AND JOIN METALS WITHOUT CUTTING

For reducing, tapering, and forming bar stock or tubing and for assembling fittings to cable, wire, or tubing, "Standard" Swaging Machines give profitable, rapid-fire production. Surface is smooth and strength is increased through this cold forming method. *There's no waste of material.* Look into the many extra features of "Standard" Swagers for fast, efficient operation.

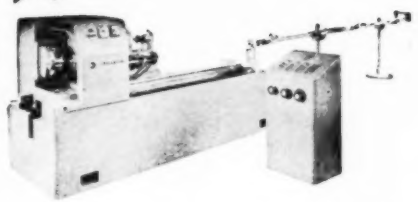
16 mm Sound Film, 26 minutes, showing principle and applications of Swaging, available to engineering and production groups. Write for open dates.

THE FENN MANUFACTURING CO.

1842 Broad Street P. O. Box 235 Hartford 1, Conn.

Manufacturers of "Standard" Power Presses to 500 Tons • Rolling Mills • Swagers • Turks Heads • Also Fenn Special Machinery

TRAVELLING TUBE CUTOFF FOR USE WITH WELDED TUBE ROLLING MILL



- Cuts tube to desired lengths directly from the mill and unloads.
- Travelling head is electrically oscillated and synchronized with the mill to insure cutting to accurate lengths.
- Can be readily installed on any mill.

Write for complete information.

THE ETNA MACHINE CO.

3409 Maplewood Ave. • Toledo 10, Ohio

Air Compressors
Aircraft Engines
Annealing Furnace Car Bearings
Asbestos Gaskets
Arc Lamps
Automobile Door Locks
Automobile Window Regulators
Abrasive Wheels
Assembly and Run-in

Belts, Drive
Bearings

Cartridge Case Coating
Cathode Ray Tubes
Corrugator
Cutting Oils Machines
Conveyors
Clocks
Condensers
Carbon Dies
Couplers
Clutch Plate Separators
Chill Coating
Cracking Coil Plugs
Copper Oxide Discs
Clamping Paste
Camera Springs
Core Oven Parts
Crank Case Oils
Camera Shutters

Die Casting
Die Casting Machines
Distributor Arms
Diesel Engines
Dampeners, Vibration
Degreaser Chains
Dies
Drawing Dies
Drying Oven Parts

Extruding Dies
Electric Irons
Electric Toasters
Electrostatic Shields
Elevators
Enameling Oven Parts

Forging Dies
Flexible Shafts
Flash Pans
Fans
Fire Alarms
Foundry Molding

Glass Tools
Glass Molds
Glass Bottoming Machines
Gasket Coating
Gears
Guns
Geiger Counters
Grids, Vacuum Tube

Heater Elements
Hydraulic Fluids
Hearing Aids
Household Appliances
High-Speed Tools

Ink, Conductive Impregnation
Ingot Mold Washing
Insulators
Internal Comb. Engs.

Joining Compounds

Kiln-car Wheel Bearings
Kilns
Knife Blade Switches

Locks, Automobile
Locomotive Rod Packings
Lead Presses
Line Shafting
Lamp Bases

Machine Tools
Motorcycles
Monotype Machines

Negative Opaquing

Oven Chains
Oxygen Compressors
Oxygen Valves
Ozonator Tubes
Optical Wedges
Outboard Motors

Push-pull controls
Printing Presses
Piezzo Crystals
Paper Mill Machinery
Piston Rings
Penetrating Lubricants
Packings
Photo-electric Cells
Projection Machines
Phonographs
Pattern Coating
Press-fitted Parts
Pneumatic Tools

Quill Bearings

Rubber Tire Molding
Rubber Parts
Roller Gate Chain Pins
Railroad Equipment
Relay Switches
Resistances
Radio Tubes
Razors, Electric
Run-In
Reduction Gears
Rocker Arms

Spray Oil
Steam Engines
Searchlights
Sewing Machines
Screw Threads
Saw Blades
Stator Coils, High Voltage
Selector Switches
Soiling Standards
Stamping Dies
Stone Crusher Machinery
Stopcocks
Swaging Dies

Typewriters
Typesetting Machines
Tapping Tools
Telephone Dial Assemblies
Tractor Engines
Traffic Signals
Trolley Wire Lubricants

Upper Cylinder Lubricants
Ucon Lubricants

Valves
Vacuum Pumps
Variable Condensers

Wire-drawing Dies
Worm Gears

Meters
Microphone Diaphragms
Mandrels
Milling Machines
Mold Ejector Pins
Mining Machinery
Molds, General

Permanent Mold Casting
Punches
Pipe Threads
Precipitators, Cottrell
Plating Machines

IS YOUR PRODUCT OR PROCESS ON THIS LIST?

YES? **"dag"** colloidal graphite dispersions are already helping someone in the same business. They can save you money, too.

NO? **"dag"** colloidal graphite has many useful properties in unique combination . . . it may be just what you need to solve a problem in your business.

"dag" *colloidal graphite is: a slippery, dry lubricating solid; resistant to high or low temperature extremes; easily mixed with most liquids and solids; chemically inert; an electrical conductor or resistor, depending on where used; composed of microscopically fine particles; black and opaque; a good conductor of heat; low in photo-electric sensitivity; possessed of a low coefficient of expansion; gas adsorbent; diamagnetic; made up of electrically charged particles; possessed of a specific gravity of 2.00-2.25 and a Moh's hardness rating less than 1.*

"dag" colloidal graphite dispersions are most commonly used for GENERAL LUBRICATION, EXTREME (HIGH OR LOW) TEMPERATURE LUBRICATION, PARTING, IMPREGNATION, AND OPAQUING; also for other applications listed on this page.

Mail the coupon NOW for more information on your specific problem. Acheson Colloids engineers are anxious to help you.

ACHESON COLLOIDS CORPORATION
Port Huron
Michigan

dag
REG. U.S. PAT. OFF.
COLLOIDS

I think **"dag"** colloidal graphite can help me in _____
(fill in specific application)

☐ Send me more information.
☐ Send a sales engineer at my convenience.

NAME _____

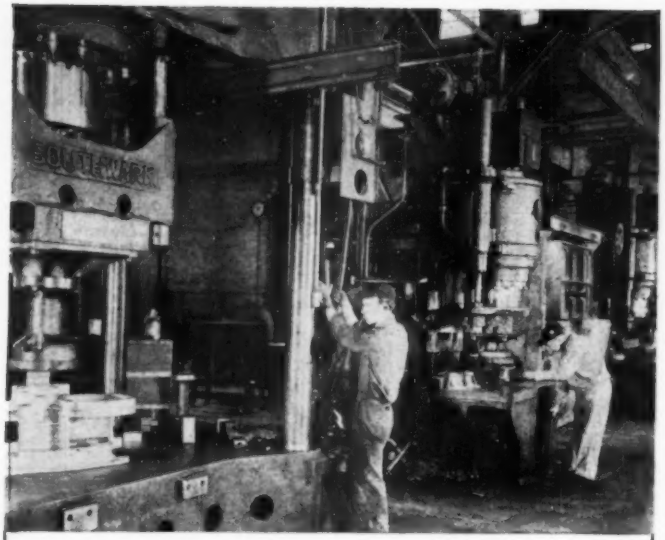
COMPANY NAME _____

STREET _____

CITY _____ ZONE _____

STATE _____

C-15



Nobody can use . . . a "JIBBER-JAWED" casting!

Nothing can be more troublesome than a "cockeyed" casting! They won't fit properly and they can't be machined as delivered; they're time wasters!

Visual inspection in the foundry can account for many defects before the casting is shipped, but there is always the element in the human equation that might not perceive inaccuracy when tolerances are minute!

In Unitcast foundries, every precaution is taken to assure casting accuracy. Every Unitcasting passes *thirty-three* inspection tests for material and contour flaws during it's development! Unitcasting's reputation for accuracy is no accident!

When *extra close* tolerances are required, mass-production orders of sufficient quantity can economically be passed through check dies to assure "dead-center" accuracy! This customer-approved operation saves many times the amounts that would be wasted by costly, superfluous handling of "ordinary" castings during machining or fitting.

Consult with Unitcast's representatives about their facilities for delivering accurate, dependable Unitcastings to suit your specifications; avoid the "jibber-jawed" time wasters!

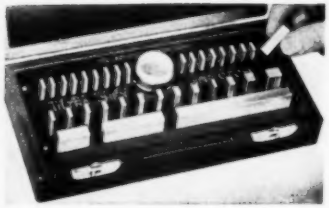
Unitcast Corporation, Steel Casting Division, Toledo, 9 Ohio. *In Canada:* Canadian-Unitcast Steel, Ltd., Sherbrooke, Quebec.

PRODUCTS LAST *LONGER* BUILT WITH *STRONGER* UNITCASTINGS

UNITCAST
Corporation
ELECTRIC STEEL CASTINGS

SCHERR *aids to precision – production*

ULTRA-CHEX GAGE BLOCKS



This SCHERR 34-Block Set Brings Five Millionths Precision

to any shop at a price so low that many shops have bought a number of sets for constant use in various departments as well as a master set for reference. The 34 blocks in the set illustrated will make 80,000 combinations in steps of 1/10,000" from .300" up to 8". In addition an optical flat is furnished for checking wear on blocks and on measuring surfaces of inspection tools.

The low price of this set enables its daily use directly for setting machines, checking mikes, snap gages, etc., saving many times its cost in the prevention of rejected work. Price, 34 block set $125.

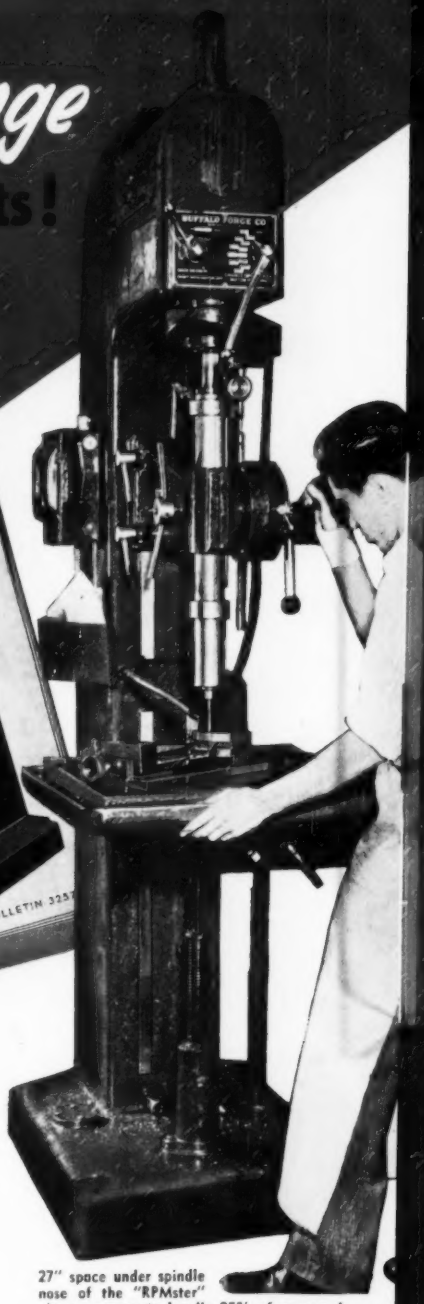
The SCHERR 9-Block Set— Practical, Valuable, Economical

Just right for personal use of the toolmaker and mechanic in producing fixtures, jigs, special tools. The 9 blocks make up 331 combinations from .0625" to 8". Standard set has optical flat of quartz for checking flatness. We have sold many hundreds of these sets for shop use to toolmakers who want their own set of dependable blocks. 9 block set with optical flat, $27.50. Without flat, $19.50.

Order direct or write for the full details on this and other Scherr precision tools in the Scherr Small Tool Catalog.

GEO. SCHERR CO., Inc.
200-D Lafayette St. New York 12, N.Y.

Think how *Instant Speed Change* Can Cut Your Drilling Costs!



Write For This Bulletin And See!

A TOUCH of the finger selects the required speed for all drilling from ⅛" to a top rated capacity of 1½" in cast iron without shutting off motor! Think of the time the "RPMster" can save you with its variable-speed drive. Hundreds of these 99"-high machines are setting profit-drilling records on job and production work.

These "Buffalo" machines are ruggedly built, as the illustration shows. Many are doing 24-hour-a-day duty.

Write for Bulletin 3257 and see the specifications that mean lower cost holes for your shop.

27" space under spindle nose of the "RPMster" gives you room to handle 95% of your work.

"Buffalo" MACHINE TOOLS

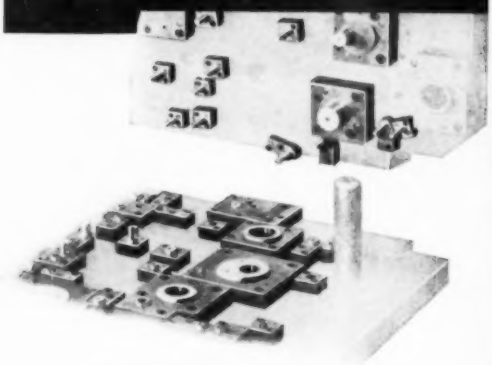
BUFFALO FORGE COMPANY

509 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

It's only part of a **DISCARDED DIE** *but . . . .*



LOOK WHAT CAN BE SALVAGED!

. . . a cost-cutting feature of R-B Interchangeable Punches and Dies

Because R-B interchangeable punches, dies and their retainers are standardized . . . completely uniform and interchangeable . . . they can be used over and over as die requirements change. Retainers are quickly and easily re-located and mounted on new die shoes. Punches and dies, when worn, can be reground into new sizes and shapes. While this saving is important, don't forget that, besides saving time and money in *die-making*, R-B punches and dies also save money in reduced press "down-time" for punch and die *replacement* because they are completely and quickly interchangeable.

GET THE **WHOLE STORY** In This FREE Catalog

A 48 page book containing full information on Allied's "one stop service." Write for your copy.

Immediate delivery on R-B punches and dies of standard sizes, shapes and materials. Special punches and dies made promptly to your specifications.

ALLIED PRODUCTS

ALLIED PRODUCTS CORPORATION

Department 29

4612 Lawton Ave. · Detroit 8, Michigan

BUILT RIGHT! PRICED RIGHT!

Simple in design. Easy to operate. Rigid construction including every worthwhile modern feature of milling machine development. With 18 spindle speeds (20-to 1000 R.P.M.) both the universal and plain millers are readily adaptable for heavy duty or light precision production work. Send for bulletin.

Send for bulletins and price list

Greaves MACHINE TOOL CO.

2021 EASTERN AVENUE CINCINNATI 2, OHIO

For ANY Size Machine

Chandler-Duplex

COMBINED Boring and Facing Toolhead

NOW! REDUCED IN PRICE

A Boring Head That Won't Face Is NOT Complete!

Accuracy -- Stamina

WRITE TODAY For Complete Details . . . . .

A Few Openings For GOOD Distributors

CHANDLER TOOL CO.

MUNCIE, INDIANA, U. S. A.

4000
PER DAY

28,000 STAMPING OPERATIONS WITH

PRODUCTO DIE SET
AND PROGRESSIVE DIE

With the use of a Producto 4 Post Die Set and modern die design, the Trumbull Electric Manufacturing Co. has stepped up production, increased accuracy and cut unit costs. The operations of this particular die include...cut box corners, pierce holes, cut knockouts, bend, form welding projections, set back knockouts, and cut off. (One other operation finishes box forming.)

Material: Coiled 10-9/16 x 16 ga. C.R. steel is hand fed to die from automatic coil cradle. *Tolerances* of ±.005 are held in some cases, and slightly higher on other operations. *Die size:* 23-3/4" x 18". *Press:* 160 ton Bliss.

Through the complete manufacturing cycle Producto Standard and Special Die Sets are held to the strict requirements established for every phase of machining. When your set is ordered from "Near Neighbor Service," there's no lost motion . . . no red tape. Shipment is fast . . . plus values built into your sets assure long, low-cost service life. Specify PRODUCTO.

Near Neighbor
SERVICE

ATLANTA Main 4451
BALTIMORE Plaza 0340
BIRMINGHAM 54-9521
BUFFALO MOhawk 1110
CAMDEN, N. J. 4-7765
CHICAGO Central 6680
CLEVELAND Superior 6159
DAYTON Madison 5361
DETROIT Walnut 1-3101
ELMIRA 5168
ERIE 5-4375
GREENSBORO, N. C. 2-0608
INDIANAPOLIS Franklin 3508
LOS ANGELES Trinity 9826
MIAMI 3-2384
MONTREAL MA 5346
NEW YORK Worth 4-7484
PHILADELPHIA Lombard 3-4482
PITTSBURGH Atlantic 4116
ROCHESTER Main 5249
ST. LOUIS Jefferson 4805
SAN FRANCISCO Exbrook 2-2230
SYRACUSE 3-1181
TORONTO Hudson 9071
YORK, PA. 2042

THE PRODUCTO MACHINE COMPANY
990 HOUSATONIC AVE.
BRIDGEPORT 1, CONN.
TEL. 4-9481

Phone for "Near Neighbor" Service

BIG

saw performance in a compact, economical package

the WELLS No. 5 METAL CUTTING BAND SAW now available with wet cutting system...

See us at the Western Metal Congress, Los Angeles, April 11-15, Booth No. B-148

The advantages of wet cutting, previously available only on larger machines, can now be had on the Wells No. 5 Utility Model Metal Cutting Band Saw. This proved-in-service system reduces cutting costs by reducing cutting time and permitting more cuts per blade. Self-contained and compact, the Wells Wet Cutting System is completely automatic with convenient controls, and does not interfere with portability. Factory-assembled on new machines or available for installation on your present machine. Get full details from your Wells Dealer or write direct.

Wells No. 8 and No. 12 Saws are available for jobs requiring larger capacity.

Design Details

Wells No. 5 Saw

- ✓ 5" x 10" rectangular capacity; 5" dia., rounds.
- ✓ Three speeds: 60, 90, 130 ft./min.
- ✓ ½ H.P. motor.
- ✓ Quick-acting swivel vise.
- ✓ Fast, accurate, and economical.

Wells SAWS

Wells

Products by Wells are Practical

METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION
505 ROOSEVELT ROAD, THREE RIVERS, MICH.

your industry's BIGGEST TRADE SHOW!

Your industry's biggest trade show isn't a once-a-year event. It comes to you with *every single issue* of this magazine. And, because it is scheduled so frequently, it can bring you a continuing series of up-to-the-minute "displays." In these advertising pages, you will find the latest news about products and services that are specially designed to help you do your job better, quicker, and cheaper. To be well-informed about the latest developments in *your* industry . . . and to stay well-informed . . . *read all the ads too.*

American Machinist

Important Questions..

about iron and steel scrap for every top business man in every industry

Q. *How* bad *is the shortage of scrap?*

A. Actually, we have enough scrap to get along, but too much of it is *light* scrap. What is badly needed today is more *heavy* scrap.

Q. *Why more* heavy *scrap?*

A. Because heavy scrap will produce *more and better* steel in *less* time.

Q. *Why is the heavy scrap shortage so* harmful *to our economy?*

A. Half of all the ingredients that are melted to make steel and castings consists of scrap iron and steel. The short supply of heavy scrap during the past year limited the production of steel mills and foundries. At the present record rate of production, there is still not nearly enough steel to meet the current and anticipated demands of our domestic economy, military requirements, and ERP. More heavy scrap will help bridge the gap.

Q. *What's being* done *about it?*

A. A drive . . . and everybody is cooperating . . . is being started for industrial scrap, to (1) help step up present steel production, and (2) *create a visible reserve of heavy scrap in the event of national emergency.*

Q. Why *is there a shortage of heavy scrap?*

A. Several reasons:

1. Very little of the 123,000,000 tons of steel and steel products exported during the war has come back as scrap.
2. With replacements scarce and expensive, much old equipment which would normally have been junked by now, is still in use.
3. A halt has been called on the junking of old vessels and military equipment which has until recently been a source of scrap.
4. The amount of heavy scrap produced in fabrication —the left-overs of machinery, etc.—is not enough to meet the demand for new steel and castings.

Q. *How about the heavy scrap that must exist in huge quantities in* Germany *and* Japan?

A. Some of this will be coming through, but not in good quantities until preparation and transportation facilities within those countries improve.

Q. *Where can* additional *scrap be obtained from domestic sources?*

A. From industrial plants which have on hand large amounts of heavy scrap in the form of obsolete machinery, idle equipment—tools, dies, jigs, fixtures, etc.—and unnecessarily large repair parts inventories. Such scrap is the best possible type for the manufacture of quality steel.

Q. *Isn't such material* ordinarily *turned in as scrap?*

A. Experience shows that plant "housekeeping" is not particularly good when plant production is high. People are too busy. However, if executives realized the critical situation, they would order the necessary steps to be taken.

Q. *How can I help in this drive?*

A. Appoint one top official in your plant as a Salvage Director —with full authority to give orders and throw out everything that is not going to be needed. Have him consult with your trade association's Steel Scrap Drive Committee. Call in your local scrap dealer. (Incidentally, the prices paid for scrap are the highest ever.) Promote your scrap drive by meetings of department heads and through plant bulletin boards and newspapers.

Q. *How do I benefit from moving scrap in addition to the money received for it?*

A. 1. You get the use of much-needed and expensive floor space now occupied by such equipment and material.
2. You eliminate the cost of keeping records and inventory.

Q. *When does the scrap drive* start?

A. Right this minute. The very next thing to do after reading this page, should be to start *your* plant's scrap drive!

Q. *What is the goal of this drive?*

A. One million tons of *heavy* scrap . . . and "housecleaning" in your plant will help.

A PUBLIC SERVICE PROJECT · THE ADVERTISING COUNCIL ·

SCRAPPY SAYS:

Search your plant for HEAVY SCRAP ...Help make MORE STEEL!

American Machinist

rock 'em
sock 'em
lock 'em

it's easier with Abbott
the all round ball

Baby buggies, pinball machines, locks . . . nothing tells the story of Abbott's versatility better than the variety of products using Abbott balls. Applications for bearing balls are countless, and Abbott's well rounded line increases their flexibility for use in almost any manufactured product. Why not take advantage of Abbott's long experience and see how it fits into your production picture. Examine the chart below for your needs, or write for complete details.

A-B CHART

GRADE	SIZES	Size Tolerances	Sphericity Within
Abbott A	1/16" — 5/8"	± .0001	.0001
Abbott B	1/16" — 5/8"	± .0002	.0002
Abbott C	1/16" — 5/8"	± .0005	.0005
Abbott Hardware	1/16" — 5/8"	± .001	.001
Abbott Industrial	1/8" — 5/8"	± .002	
Abbott Special	1/8" — 5 15/32"	± .003	
	11/32" — 5/8"	± .005	

ABBOTT

THE ABBOTT BALL COMPANY
HARTFORD 10, CONN.

P.S.
The round hole in the square peg can help you with your burnishing problems, too. Ask for a sample kit.

ABRASIVE
SURFACE GRINDERS

EXCLUSIVE AGENTS

ASHEVILLE, N. C.
Tidewater Supply Co., Inc.

ATLANTA 1, GA.
Childs, W. P.
845 Memorial Drive S. E.
P. O. Box 700

BIRMINGHAM 2, ALA.
Young & Vann Supply Co.
1725-1731 First Ave.

BOSTON 16, MASS.
Rudel Machinery Co., Inc.
532 Statler Bldg.

BUFFALO 7, N. Y.
Keller, George Machy. Co.
1807 Elmwood Ave.

CHICAGO 6, ILL.
Marshall & Huschart Machy. Co.
571 Washington Blvd.

CINCINNATI 2, OHIO
Motch & Merryweather Machy. Co.
First National Bank Bldg.

CLEVELAND 13, OHIO
Motch & Merryweather Machy. Co.
715 Penton Building

COLUMBIA, S. C.
Tidewater Supply Co.

DAYTON, OHIO
Motch & Merryweather Machy. Co.
1305 American Building

DETROIT 2, MICH.
Cheney, G. H. & W. H. Marsden
5735 Cass Ave.

INDIANAPOLIS 4, I.
Marshall & Huschart Machy. Co. of Ind.
Chamber of Commerce Building

KANSAS CITY, MO.
Blackman & Nuetzel Machy. Co.

KNOXVILLE 5, TENN.
Murrian, The W. S. Co.
912 W. Clinch Ave.

LOS ANGELES 21, C.
Henes-Morgan Machy. Co. Ltd.
2026 Santa Fe Ave.

MINNEAPOLIS 1, M.
Satterlee Co., The
118-120 Washington Ave., N.

NEW ORLEANS 6, LA.
Dixie Mill Supply Co., Inc.
901 Tchoupitoulas

NEW YORK CITY 17
Rudel Machinery Co., Inc.
100 East 42nd St.

NORFOLK 1, VA.
Tidewater Supply Co., Inc.
P. O. Box 839

OMAHA 2, NEB.
Cardinal Supply & Mfg. Co.
427-30 Sunderland Bldg.

PHILADELPHIA 3, PA.
Swind Machinery Co.
Broad St. Station Bldg.

PITTSBURGH 22, PA.
Motch & Merryweather Machy. Co.
717 Liberty Ave

ROANOKE, VA.
Tidewater Supply Co.

ROCHESTER 4, N. Y.
Keller, George Machy. Co.
509 Commerce Bldg.

SAN FRANCISCO 7, C.
Jenison Machinery Co.
20th & Tennessee Sts.

SEATTLE 4, WASH.
Hallidie Machinery Co.
2726 First Ave., S.

SHREVEPORT, LA.
Dixie Mill Supply Co., Inc.
200 Edwards Street

ST. LOUIS 8, MO.
Blackman & Nuetzel Machy. Co.
3713 Washington Blvd.

SYRACUSE 2, N. Y.
Briggs, C. H. Mach. Tool Co. Inc.
Onondaga Hotel Bldg.

W. HARTFORD 7, CT.
Rudel Machinery Co., Inc.
7 South Main St.

ABRASIVE MACHINE TOOL CO.
EAST PROVIDENCE 14, R. I.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER
on Your Work

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1¾" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 16

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

NATIONAL MACHINE TOOL CO.
CINCINNATI 22, OHIO

CUT Plant Rearrangement Costs

with

SQUARE D's PLUG-IN DUCT

Production capability of the modern plant is directly related to arrangement of machinery and equipment. Rearrangement may be necessary to take full advantage of an improved process or to permit economical manufacture of a new product.

PLUG-IN DUCT can be installed with a minimum of delay and expense near ceilings, along walls, or directly above machinery to provide power where it is needed. It replaces the more conventional panelboards, which have conduit-enclosed feeders, typical of less modern installations.

Write **for Bulletin 5600. Address Square D Company, 6060 Rivard Street, Detroit 11, Mich. Or call your nearby Square D Field Engineer for help in laying out your duct system.**

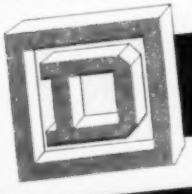
GET THESE FEATURES

Round Copper Bus Bars provide greater mechanical strength and resistance to short-circuit stresses. Supports are non-carbonizing porcelain.

Plug-in Units of either circuit breaker or fusible switch types are easily installed at 2-foot intervals along both sides of the duct. Plug-in stabs grip the round bus bars with exceptionally high pressure. A hook-type bracket permits rotation of the unit into place. A single clamp screw at bottom holds it there.

Hanger Brackets of heavy gauge steel are two-piece construction to facilitate assembly around duct enclosure. They are suitable for either edgewise or flat mounting of duct structure.

Flexible Connectors of laminated copper join bus bars between sections to provide for expansion and contraction, permit proper alignment and insure tight joints. All bolt heads face outward.

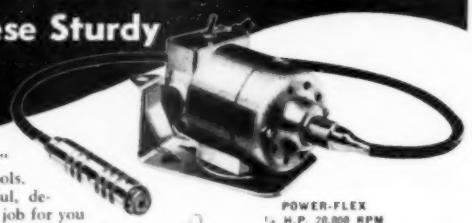


SQUARE D COMPANY

DETROIT • MILWAUKEE • LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

You Can Grind • File • Polish • Burr
EASIER — FASTER — BETTER
With These Sturdy Dumore Tools



You don't have to "baby" Dumore Flexible-shaft tools. They're rugged, powerful, dependable tools that do a job for you shift after shift, day after day. And that holds good whether they work on tough continuous-duty production jobs, or on delicate and exacting toolroom operations.

3 Types to Choose From

Choose the Dumore that fits each of your particular jobs. You have a range of speeds, capacities, power, and control to cover every requirement for high-speed work. And each of the three gives you the same important basic operating advantages.

- A strong, durable shaft — with high flexibility for easy maneuvering.
- Light, sensitive, cool-running handpieces for easy work and close-control.
- Powerful, vibration-free Dumore motors built for long, trouble-free service.

Cost-Cutting Versatility

Put these cost-cutting Dumore tools to work in your shop. Use them on all off-hand operations. Build low-cost automatic set-ups around one or more — They make dependable, efficient workheads.

POWER-FLEX
¼ H.P. 20,000 RPM
$69.50

UNI-FLEX
1/15 H.P.
15,000 RPM
$44.75

DUO-FLEX
1/15 H.P. 500-3500
(Gear Shaft)
3500-15,000 RPM
(Motor Shaft)
$52.60

Choice of 2 Handpieces

No. 2-203: Ball bearings; 0-¼" geared chuck. (Standard with Uni-Flex and Duo-Flex. Can also be used on Power-Flex).

No. 2-204: Ball bearings; ¼" capacity chuck with ⅛" collet (Standard with Power-Flex).

Foot Rheostats

To give you speed variation or to leave both hands free — rugged foot-control rheostats are available for all these machines.

FREE — complete facts in Bulletin No. 264

TEAR OUT THIS COUPON AND MAIL TODAY

The Dumore Co., Dept. C-14, Racine, Wisconsin
Please send me FREE Flexible-shaft Bulletin 264

Name.....Position.....
Company.....
Company Address.....
City.....( ) State.....

C-39

"HOLY MOSES... there's something I never knew before!"

F-11A

Unless you're exceptionally well-informed there are probably lots of things YOU never knew before right here in the advertising pages of this magazine.
Alert manufacturers use these advertising pages to get the *news* about their products and services to you . . . quickly and effectively.
Their advertisements contain information designed to help *you* do your job better, quicker and cheaper.
To be well-informed about the latest developments in *your* industry . . .
and to stay well-informed . . . *read all the ads too.*

American Machinist

VALUABLE DATA...

On Electroplating

A 16-PAGE SPECIAL REPORT

YOU WON'T WANT TO MISS

Beginning on Page 107 this issue.

One of a series *of messages to help you increase your understanding of business paper advertising, and its effect on your job.*

You know more about advertising than you think !

IF YOU UNDERSTAND the basic principles of mass production —

If you're on familiar ground when it comes to time-motion studies, obsolescence curves, and assembly-line techniques —

If you regard every operation in your plant as a challenge to further reduce your manufacturing cost-per-unit —

Then you know a lot more about advertising than you think. Yes, *advertising!*

For basically, advertising is the application of assembly-line techniques to the *manufacture of a sale.* And how are sales manufactured? Like any other commodity, by sequence of "processing operations." In this case they include —

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

Couldn't your salesmen handle this entire sequence? Certainly — if you had *enough* salesmen, and weren't concerned about the cost. But no salesman should *have* to spend his valuable time on missionary work. Not when those first three steps can be *mechanized* for him — not when they can be handled so much more economically — through the efficient use of business paper advertising.

Why *business* papers? Because nowhere does your advertising work more efficiently than in the business publications which reach your best prospects. Nowhere else can "mechanized selling" contribute so much toward reducing the cost of manufacturing a sale!

American Machinist

is a member of The Associated Business Papers, who have published an interesting folder entitled, "10 ways to measure advertising effectiveness." We'll be glad to send you a copy. And if you'd like reprints of this advertisement (or the entire series) to pass along to others in your organization, just say the word.

Kennametal is controlled in conformity with precision methods that time and experience have proved to be the best for producing cemented carbides of consistent worth.

Our U.S. currency has, for 15 years, been under arbitrary controls set by official decree in violation of traditional experience with sound money systems.

The controls of Kennametal are exacting and continuous to assure that: basic ingredients are pure; carbides true and of correct particle size; compositions accurately blended; blanks pressed compactly; and sintering processes free from contamination.

Currency control, as now in vogue, is illogical and unscientific. Since anchorage to gold was removed by edict, irredeemable paper certificates have been freely issued. They are merely vague promises to pay amounts not clearly defined—symbols of debt, unsupported by adequate resources.

The rigorous control of Kennametal is an asset. It results in the production of more carbides, yet their value as cost-saving materials is enhanced and maintained. Durability permits a satisfactory job to be done with fewer "units."

The lax control of currency is a liability. Money is no longer a fixed measure for present or future evaluation, a reliable medium of exchange, nor a check on the public purse by citizens. More dollars are in circulation, but their purchasing value has been greatly reduced. Cheap money always brings high prices—because more "units" are required for a given job.

To offset dollar rises in costs during inflation or to safeguard profit margins in times of deflation, you can improve the efficiency of plant operations and increase production by a more widespread use of Kennametal.

To effect correction of deranged economic conditions, you can urge the enactment of legislation that will bring back a stabilized monetary system—the redeemable Gold Standard.

PHILLIE GEAR

GEARS

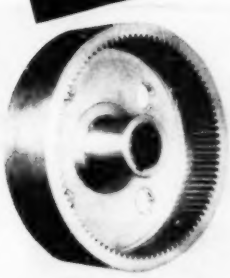
WHEN, AS, AND HOW YOU WANT THEM

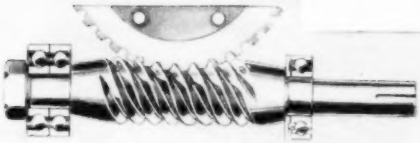
*

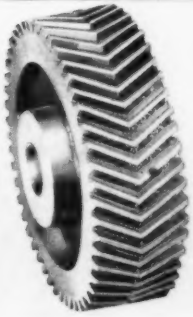
One gear or a thousand to meet your most exacting requirements, . . . gears of any type, size, and material,—Continuous Tooth Herringbones; Worms and Wheels; Spurs; Spirals-Bevels; "Zerols"; "Hypoids"; Helicals; Mitres; Intermittents; Non-Metallics; Racks, etc.—they're all made in our large modern shop, by gear craftsmen.

Send for our latest "Gear Book,*"—and please use your Business Letterhead when writing for it.

"For Over 57 Years, Manufacturers of Gears"







Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO
IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

GANSCHOW CUT GEARS

SPUR—SPIRAL
BEVEL—RACK
AND PINION

UP TO 60" PITCH DIA.
UP TO 10" FACE WIDTH

GANSCHOW GEAR CO. • 14 N. MORGAN ST. CHICAGO 7.

QUALITY GEARS CUT TO ORDER

• MEISEL produces but one *kind* of gears . . . gears constructed for specific jobs. Only through the inherent accuracy of this special designing could such dependability, performance and economy be possible. Tell us what you expect it to do, and we'll show you the one gear suited for your job.

MEISEL PRESS MFG. CO.
946 Dorchester Avenue Boston, Mass.

BILGRAM BEVEL GEARS

Straight — Spiral Teeth

ALL TYPES
ALL MATERIALS

BILGRAM GEAR & MACHINE WORKS
1217-35 Spring Garden, Philadelphia, Pa.

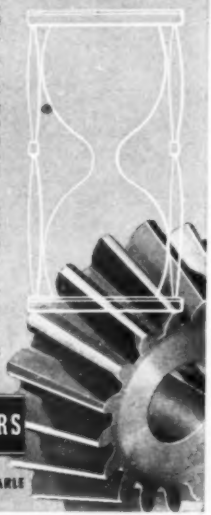
EARLE GEARS ARE BUILT TO GIVE LONG SERVICE

You can expect—and get—long trouble-free service and smooth, quiet operation from Earle Gears and Earle Operating Machinery.

Because Earle Gears are cut to extremely close tolerances to insure constant, uniform transmission of power through proper distribution of the load across the entire gear face. And, every Earle Gear is cut exactly to your specifications from whatever material best fits the application.

So, if you need gears, send us your drawings and specifications for quotation. You'll get immediate attention and prompt delivery.

THE EARLE GEAR & MACHINE CO., 4707 Stenton Ave., Philadelphia 44, Pa. Sales Offices: 149 Broadway, New York 6; 901 Davis Ave., Pittsburgh 12, Pa.; 7735 Market St., Youngstown, Ohio.



EARLE GEARS

It's good business to do business with EARLE

Here's a Lead Worth Checking

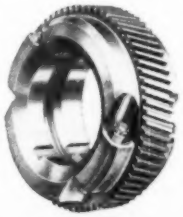
The right gear for the job . . . conserves materials, saves workmen's time, improves results . . . cuts production costs.

- ★ SPUR
- ★ BEVEL
- ★ HELICAL
- ★ SPLINE
- ★ WORM
- ★ SPECIAL

The manufacturer, design engineer and production expert make the selection of dependable gears one of their definite responsibilities.

It is common practice in hundreds of plants to specify *Cincinnati Gears, Good Gears Only*. Their precision control, accuracy and performance guarantee assured dependability.

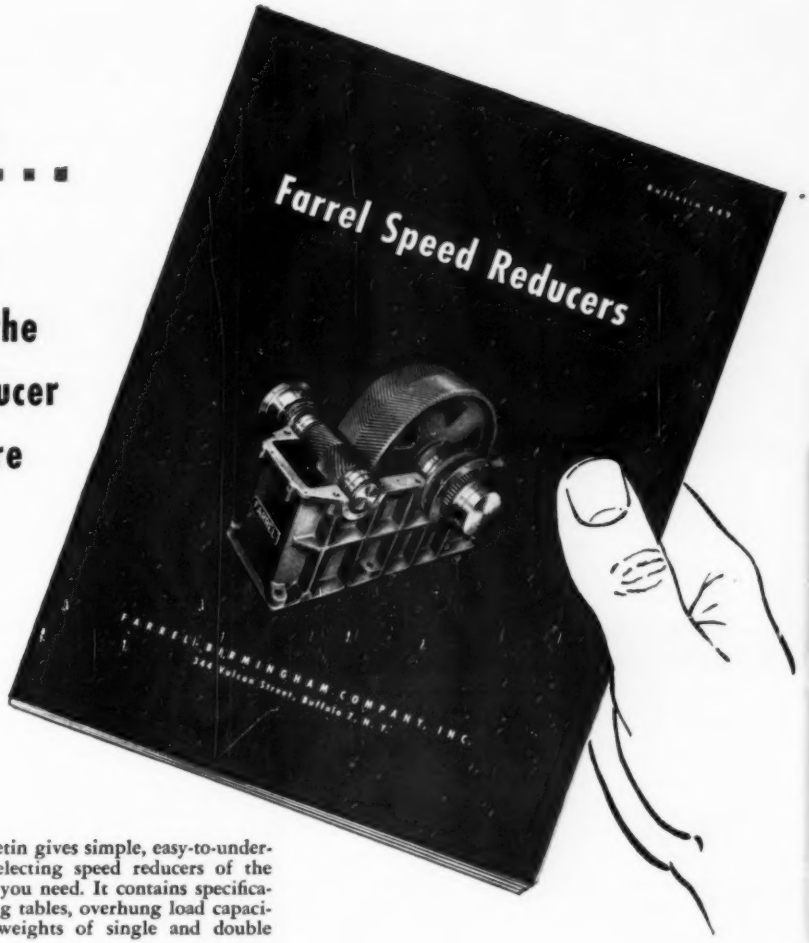
Each Cincinnati Gear is made to fit your particular specifications . . . saves time and money and puts the right gear in the right place.



THE CINCINNATI GEAR COMPANY
"Gears . . . Good Gears Only"
Wooster Pike and Mariemont Ave. ★ Cincinnati 27, Ohio

NOW...

it is easy to select the speed reducer you require



This *new* 44-page bulletin gives simple, easy-to-understand directions for selecting speed reducers of the horsepower and speed you need. It contains specifications, horsepower rating tables, overhung load capacities, dimensions and weights of single and double reduction units.

These reducers are equipped with Farrel-Sykes continuous-tooth, herringbone gears—the famous *Gear with a Backbone* — which provide extra strength and high load-carrying capacity. Because they are generated with a high degree of precision, these gears are extremely quiet in operation and give many years of trouble-free service.

Other features described in the bulletin, which contribute to smooth, efficient power transmission, include rigid and accurately ground shafts properly mounted in roller bearings, and heavy-section cases that hold rotating elements in precise alignment.

FARREL-BIRMINGHAM CO., INC., 344 Vulcan Street, Buffalo 7, N.Y.
Plants: Ansonia and Derby, Conn.; Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Detroit, Chicago, Los Angeles, Tulsa, Houston

Farrel-Birmingham

If you buy or specify speed reducers, you should have a copy of this handy manual. Fill out the coupon and drop it in the mail today.

FB-501
IA

Farrel-Birmingham Co., Inc., 344 Vulcan St., Buffalo 7, N.Y.

Please send me, without cost or obligation, a copy of Bulletin 449, "Farrel Speed Reducers."

Name_____

Company_____

Address_____

City_____ State_____

GEARS of every description...

to utmost accuracy.

Also complete facilities for all types of cams and thread grinding.

SPECIAL MACHINERY BUILT TO ORDER . . .

Large capacity devoted exclusively to the building of Machines, Assemblies and Parts for other concerns. Estimates furnished promptly upon receipt of prints or letter of inquiry. Bulletin E-200 lists our machine equipment.

HARTFORD *Special*

The HARTFORD SPECIAL MACHINERY Co., Hartford 5, Conn.

GEAR CUTTING MACHINES

Well Designed . . . Good Features
Create Production Advantages

NEWARK GEAR CUTTING MACHINE CO.
69 PROSPECT ST., NEWARK 5, N. J.

BAUMBACH *The* DIE SET AUTHORITY

All Baumbach Die-Sets have demountable Leader Pins and Bushings. This exclusive feature permits removing Leader pins for machine work on the die shoe and assures reassembly without loss of alignment. A big time and trouble saver. Write for Catalog.

E. A. BAUMBACH MFG. CO., 1804 S. Kilbourn Ave., Chicago 23, Ill.

ALMOND DRILL CHUCKS

Maximum Gripping Power with Extreme Accuracy and Long Life

Write for Catalog

T. R. ALMOND MFG. CO.
Ashburnham, Mass., U.S.A.

D.O.James
Established 1888

MOTORIZED GEAR SPEED REDUCERS

A CENTERALLY BALANCED DRIVE WITH GREAT EMERGENCY STRENGTH

Simplified assembly using standard flange motors, coupling connected with high speed pinion gear shaft, making for greater accessibility.

SINCE 1906 . . . When the first D.O.James Motorized Gear Speed Reducer was built . . . We have improved the design and manufacture of Motorized Gear Reducers, maintaining in them the same high quality of manufacture as our other standard Gear Speed Reducers.

The many advantages of D.O.James Motorized Gear Speed Reducers and their continued proven performance for many years make them a leading choice with power transmission designers and engineers.

D.O.JAMES GEAR MANUFACTURING CO.
MAKERS OF ALL TYPES OF GEARS AND GEAR SPEED REDUCERS
1140 WEST MONROE STREET, CHICAGO, U. S. A.

ECONOMY

For THE W&B Co *Water Solubles*

Paste Form
Liquid Type

Grinding
Cutting
Drawing
Milling
Turning
Reaming
Drilling
Tapping
Broaching

Regardless of how tough or critical your metalworking jobs may be, there is an Economy Lubricant to meet your requirements.

If the problem is finish, after-protection, closer tolerances, accurate form or increased production, Economy Lubricants will help solve it.

Economy Lubricants offer advantages which we would like to discuss with you

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.

Water Solubles for Cutting, Grinding, Drawing, Grinding Oils, Spindle Oils, Sulphurized Fatty Bases

PHOTO COURTESY OF THE NATIONAL MACHINERY CO., TIFFIN, OHIO

GEAR and PINION by NE

A Press so big . . it had to be assembled on it's back!

HERE is the Neloy Alloy Cast Steel Gear and pinion drive of a No. 10 National Machinery Company Maxipres so big it had to be assembled on its back. The large gear is Neloy Molybdenum, Normalized; 190-220 Brinell rough weight 26,130 pounds. The pinion is Neloy No. 3; Alloy Steel, quenched, 202-240 Brinell rough weight 3,480 pounds. Both are 4 inch circular pitch, 16 inch face. Gearing such as this, while not routine production, is taken in stride at National-Erie Corporation where your specification requirements are completely controlled from the raw material to the finished product. Neloy or Neloy Moly, spur, bevel, mitre, Sykes Herringbone, finished gears or blanks are specialties of our Foundries and Machine Shops . . . Send your specifications to us. Bulletin No. 9 gives full details. Write for it.

NATIONAL ERIE CORPORATION

ERIE, PENNSYLVANIA • U. S. A.

● Here it is—full details about McCrosky's new line of inserted blade face mills, end mills, half side and staggered tooth cutters.

The catalog lists sizes, dimensions and prices—gives full details about the many standard cutters newly developed for steel, cast iron and aluminum.

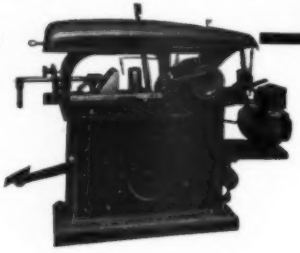
All the pages haven't been printed yet. Send today for those that are ready—and we will mail the additional pages to you as fast as they are completed.

LOST CUTTING TOOLS

McCROSKY
TOOL CORPORATION
MEADVILLE, PA.

Jack-Lock® MILLING CUTTERS
Adjustable BLADE REAMERS
Quick-Change CHUCKS
Turret TOOL POSTS
Block Type BORING BARS
SPECIAL *Multiple Operation* TOOLS

Reduce . . .
HACK SAW CUTTING TIME
WITH
KELLER
POWER
HACK SAWS



Cuts everything from thin wall stock to heaviest bar stock faster. With quick easy turn of the new feed control, you get 0 to 125 pounds blade pressure.

ILLUSTRATED: The Keller No. 3 Hy-Duty Hack Saw with new adjustable feed control, automatic lift on reverse stroke, adjustable foot lift, automatic stop switch, and many other time and money saving features. Choose from 8 Keller Hack Saw Models.

WRITE FOR FREE NEW BULLETIN NO. 104-A.

Sales Service Machine Tool Co.
2363 UNIVERSITY AVENUE
ST. PAUL 4, MINNESOTA

MACHINING AIDS FOR MODERN METALWORKING PLANTS

Here's a package of AMERICAN MACHINIST Special Reports which will help you check machining practice in your plant against latest developments.

Reprint Set "A" contains six full-length Special Reports reprinted from AMERICAN MACHINIST:

HOW TO WORK WITH CUTTING FLUIDS—*8 pages*

HOW TO SHARPEN CUTTING TOOLS—*20 pages*

WAR TURNS A PAGE IN MACHINING—*16 pages*

HOW TO SET UP CARBIDE MILLING JOBS—*24 pages*

HOW TO WORK MAGNESIUM ALLOYS—*16 pages*

HOW TO WORK ALUMINUM & ITS ALLOYS—*16 pages*

To obtain your personal copies of these informative booklets, pin a dollar bill to your letterhead and ask for Reprint Set "A". Send your order today to

Reader Service Department

American Machinist
330 WEST 42nd STREET
NEW YORK 18, N. Y.

Price list of other Special Reports sent on request

SEARCHLIGHT SECTION

REPLIES (Box No.):
Address to office nearest you
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

SELLING OPPORTUNITIES OFFERED

WE NEED a live and experienced salesman for die heads and other small tools. For a man with ability and who can assume responsibility, this is a good opportunity for future advancement. Give outline of experience, age, names of companies, as well as salary expected. This will be treated as strictly confidential. SW-8110, American Machinist.

SALES AGENT wanted in Pittsburgh and also in Chicago area, to sell imported hand screw machines, latest, etc., of exceptional accuracy and versatility with maximum bar capacity of 9/16". Applicants please name manufacturers now represented. SW-8284, American Machinist.

EMPLOYMENT SERVICE

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service. 39 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc. 266 Dun Bldg., Buffalo 2, N. Y.

ENGINEERS: LARGE college offers $3000, approx. half time teaching-studying. All ranks univ. positions, experienced $4500-$6500 nine months. Give phone, photo, qualifications. Cline Teachers Agency, East Lansing, Mich.

POSITIONS WANTED

METALWORKING ENGINEER, experienced in all type of metalworking processes and reduction of costs. 14 years in development, shop operation and management. M.E. and M.S. degrees from leading colleges. Highly trained in the tools of modern management. Now employed but available soon. Your opportunity to engage an unusual engineer as a project engineer or assistant works manager. PW-8209, American Machinist.

TOOL ENGINEER: Experienced in tool design, processing, machine time, and estimating—10 years shop experience. PW-8248, American Machinist.

REGISTERED PATENT Lawyer. Mechanical engineer and law graduate. Five years mechanical engineering experience in administrative and development work. Six years experience as patent attorney covering preparation and prosecution of applications, validity and infringement opinions. Desires permanent position with corporation in Chicago area. PW-8291, American Machinist.

SELLING OPORTUNITIES WANTED

MANUFACTURERS REPRESENTATIVE in the Pittsburgh district wishes to handle bar steel, sheet steel, forgings, cast steel and cast iron casting accounts. Fifteen years industrial sales experience in this territory. RA-8138, American Machinist.

BUSINESS OPPORTUNITY

Wanted: Partner

with technical and business skill to help produce a newly developed special Capital Machines for Domestic and Foreign markets. $20,000 will do. The company 3 years old, well established and financially solvent mfg. co. Ideal location, Rocky Mountain area. BO-8326, American Machinist.

PATENT ATTORNEY

Patent Practice

before U.S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Alwine and Rommel, Registered Patent Attorneys, Suite 453, 815-15th Street, N. W. Washington 5, D. C.

Manufacturers Representative
SALES REPRESENTATIVE

Sales Engineer now representing engineering organization seeks to represent one additional firm in the mechanical field on an exclusive sales basis in the State of Ohio.

RA-8312, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

If you can answer "Yes" to these questions . . .

YOU WILL WANT TO INVESTIGATE THIS PROMISING JOB NOW

Are you a graduate engineer?

Have you had enough practical experience in metalworking production to have a working knowledge of machine tool and other production equipment applications? Do you have an inquisitive mind, like to explore the new methods and techniques by which metalworking can build better, lower-cost products?

Can you write clearly and concisely about what you know and learn . . . for the benefit of other production men, particularly the executives who operate Metalworking's production shops?

Do you like to travel sometimes, talk to people, get out in production shops, dig into new problems, spark ideas?

Would you like to make writing about metalworking production machinery, methods, and techniques a promising and lifetime career?

For you who answer "yes" to these questions, and are young enough (under 35) to build a successful future in one of Metalworking's most interesting and challenging professions, write **new.** Give us full details about your age, education, experience and salary requirements. And make your letter, **please,** as indicative as possible of your ability to write clearly and interestingly. Your reply will be held in strictest confidence, and we will be in touch with you promptly if your qualifications seem to fit the requirements for this excellent, and growing position.

P-8338, AMERICAN MACHINIST
330 West 42 St., New York 18, N. Y.

TAPS & DIES

Factory representative required for HIGH GRADE world-renowned British brand. Must have coast-to-coast connections. Full details to

RW-8308, AMERICAN MACHINIST
Aldwych House, Aldwych, London, W.C. 2

FOR IMMEDIATE DELIVERY
28"/50" swing x 20' bed
NEBEL SLIDING BED GAP LATHE
Geared head, Timken bearing.
Built new in 1942.
Takes bet. centers—14' 3" closed; 22' 9" extended.
AC-MD; fully equipped incl. taper att.
Write, Wire or 'Phone
ALEX ZEEVE & COMPANY
2617 Woolworth Building New York 7, N. Y.
'Phones:
COrtlandt 7-8250 BEekman 3-1246

28/60 CINCINNATI HYDROTEL MILLER 1 spin., hand feed, 360 deg. profiling attachment, 1942.
Cinci. 4 Spin. 360 deg. Auto. Profiler, Late
BENNETT MACHINERY CO.
30 Church St. New York 7, N. Y.

FOR SALE
Westinghouse motor, 75 hp, 60 cycle, 3 phase, 220 volt, Type C.I., frame 653 C, Complete with controller and grids, Suitable for crane, heavy fabrication machinery, etc. Used only about 20 hours.
PULVERIZING MACHINERY COMPANY
Chatham Road Summit, N. J.

AUTOMATICS—Nat. Acme 1½", four spindle. Bargain.
GRINDER—(Rotary) Blanchard 25" mag. chuck, belt $500.
HYDROHONER—Micromatic Model #4H (1943)
LATHE—So. Bend Tool Room, 14"x6' Taper, late.
Bamford-Chase Tool Room, 14"x6' Taper, late.
Bridgeford, Engine, g. head, 32"x21' centers.
MILLER—Plain K. & T. #4K, Late.
PRESSES—(2) Bliss #305—100 ton, late
(2) Bliss #6—125 ton, late
(1) Lake Erie—750 ton, hydraulic, Bed 81½"x146", single or dble action, Late.
SHEARS—Niagara 10'x10 G, gap
Barth (New) 54"x14 G.
WELDERS—(New) Sterling 10, 20, 30 KVA, Bargain.

KINGS COUNTY
MACHINERY EXCHANGE
408 Atlantic Ave., Brooklyn 17, N. Y.
Phone TRiangle 5-5237

MILLERS FOR SALE
BRIGGS Type 2A 18" feed Hyd. Latest
BROWN & SHARPE #13 Plain Auto. Motor Drive
CINCINNATI #3, #4 Plain rect. overarm MD
INGERSOLL 30x24x12' Planer Type MD
KEARNEY & TRECKER #4 Heavy Timken MD
SUNDSTRAND Model 3A Duplex Timken Latest
VAN NORMAN #3 Duplex Universal MD
HARRISON MACHINERY EXCHANGE, INC.
South 4th St., Harrison, N. J.
Tel.: HUMBOLDT 2-3750, 2-3773

Kearney & Trecker No. 2 BS plain milling machine, geared head single pulley drive. Double overarm, self oiling, coolant system. Price $1500.00.

Brown & Sharpe No. 2 B heavy plain milling machine, geared head, single pulley drive, coolant system, equipped with slotting attachment. Price $1800.00.

Both rebuilt, 30 day guarantee.

H. R. MOCH
150 Second Avenue, Rensselaer, N. Y.

NEW RESISTANCE SPOT WELDER COMPLETE
For Aluminum made by Precision Welder & Machine Co., Cincinnati, O.
Serial #553, 440 Volts 60 c. single ph. 8 x 3 throat area. 150 K.V.A. Max. temp., rise 176 deg. F. at 50% duty cycle, Transformer, Ignition, welding electrodes, water cooled, G E Controls 36" throat. $4,000 (original cost $5,200) P.O.B. Brooklyn, N. Y.
RICHARD L. SANDFORT, INC.
22 E. 49th St.—Plaza 9-5151—N. Y. 17, N. Y.

CONTRACT WORK

F. F. SLOCOMB CORPORATION
Wilmington 99, Delaware
Builders of Special Machines a Specialty. Facilities Available for Production. Quantities of Small and Medium Precision Parts.
Equipment List on Request

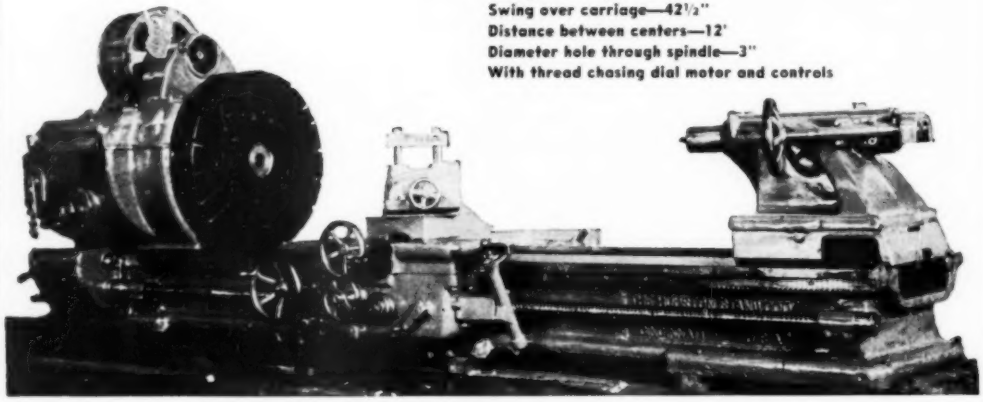
PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us — we will take care of them.
GENERAL PATTERN WORKS
2333 Bank Street Cincinnati, Ohio

EMERMAN Offers From Stock

Heavy Duty Engine Lathe

54" x 18' HOUSTON STANWOOD & GAMBLE

Swing over ways—54"
Swing over carriage—42½"
Distance between centers—12'
Diameter hole through spindle—3"
With thread chasing dial motor and controls



2000 TON HPM. FASTRAVERSE HOBBING PRESS
7" DETRICK & HARVEY PLANER TYPE BORING MILL

EMERMAN MACHINERY CORP. 875 W. 120TH ST. CHICAGO 43, ILL.

Late Type — **EVERY MACHINE TESTED AND GUARANTEED AS REPRESENTED** — *Immediate Delivery*

LATHES

SOUTH BEND 10"x34½", 14½"x6', 16"xx'
BRADFORD, 16"x6'
HENDEY 16"x8', taper attach.
RIVETT, No. 608 taper attach. precision
LE BLOND 'REGAL' 13"x4'
ELGIN & HARDINGE PRECISION, 1" cap.
PRATT & WHITNEY 10"x30", precision
PRATT & WHITNEY, 13"x6', taper attach.
SIDNEY, 18"x10', taper attach.
SEBASTIAN 12"x6' GH M.D.
AMERICAN 16"xx' M.D.
SPRINGFIELD 16"x8', Motor in Base, 12 speeds
MONARCH 14"x8' GH TA.
AMERICAN 24"x12' GH QC TA.
REED PRENTICE 26"x8', Late, 1943.
MONARCH 18"x6' Model C.
HARDINGE Precision second operation

TURRET LATHES

GISHOLT, bar equip. preselector, #5, #1L
WARNER & SWASEY, #1A chucking
FOSTER #5 universal, bar feed
WARNER & SWASEY #1, ⅝" cap. hand
BROWN & SHARPE #1 Hand Screw
BARDONS & OLIVER #5 Preselector 2" cap.

SHAPERS

Gould & Eberhardt, 20" Industrial
Stockbridge, 16" M.D.

DRILL PRESSES

American Hole Wizard 6'x15" col. Bot table
American Radial, 4'x11" column
Avey, #2 single spindle, 15" overhang
Leland-Gifford #2 single spindle
Allen, 6 spindle, #2, 12" overhang
Buffalo #22 BG FP #4 MT
Cleerman drill box col. 25", #MT
Foelick 4 Sp. #5 BM, #3 MT.
Walker-Turner Radial ½ H.P.

GRINDERS

BROWN & SHARPE #2 Universal
NORTON #2 Universal Hydraulic Tool & Cutter
COVEL #21A, tool & cutter universal
LANDIS cylindrical, type H, 4"x12"
HEALD #72A3, plain internal, HYD.
BLANCHARD, VERTICAL SURFACE, #10, 20"
BLANCHARD, VERTICAL SURFACE, #11, 36"
ABRASIVE, VERTICAL SURFACE, #23 8x24"
BROWN & SHARPE, #5 surface hyd.
REID, SURFACE 2B Pope spindle
RIVETT #104—Int.—Ext. Latest
BROWN & SHARPE #2 & #2B Surface
Excello Thread Grinder #31
GALLMEYER & LIVINGSTON 12x24 Hydraulic
Do-All Hyd. Surface Grinder 6"x18"
Cincinnati Universal Grinder 12"x36", ext. int.
Wicaco Precision Internal
Cincinnati cylindrical 12x72" centers
GARDNER 2B Polishing Lathe with Rotex Close Dust Collector

PLAIN MILLERS UNIVERSAL

BROWN & SHARPE, #2A, UNIVERSAL
BROWN & SHARPE, #3B, PLAIN
BROWN & SHARPE, #3, UNIVERSAL
CINCINNATI, #2MH, Universal
BROWN & SHARPE #2 Light Type, Vertical Head
VAN NORMAN 2-ℓ and #12 Duplex Ram type
VERNON Miller, motor in base
CINCINNATI #3 plain M.D.
PRATT & WHITNEY #12B Profiler 2 sp.
LEES BRADNER Thread Miller 12"x54" HT

VERTICAL MILLERS

CINCINNATI, #3, #4, dial type
VAN NORMAN, #2V, rapid traverse
KEARNEY & TRECKER, #3KM, dial type
KEARNEY & TRECKER, #3H, dial type
PRATT & WHITNEY Jig borers #2
MOORE Jig Borer
SWISS Jig Borer #5B Univ. Table

PRODUCTION MILLERS

WALTHAM thread miller, ext. & Int.
CINCINNATI, #1-12 automatic
KEARNEY & TRECKER, #1H-18 Mfg. type
BROWN & SHARPE #000, high speed

GEAR MACHINERY

FELLOWS #61A
GLEASON, 18" and 24" cap. Bevel Gear Cutters
GOULD & EBERHARDT, #325, spur gears
Barber Coleman #12, 12" cap.
Gleason 2" straight bevel.
Gleason 3" spiral Gear Cutter
Gleason Gear Tester

AUTOMATIC SCREW MACHINES

BROWN & SHARPE #0G, ⅝" cap.
BROWN & SHARPE, #2, high speed
BROWN & SHARPE, #00, high speed ⅜" cap.
ACME GRIDLEY 2" cap. RAS
ACME GRIDLEY 1" cap. RAS

BOREMATICS AND BORING MILLS

Defiance #25A Horizontal 2⅜" Bar
Lucas No. 41, 9" cap. extra long table

MISCELLANEOUS

Niagara Model 36 Gap Shear 72"x⅜" cap. 18" gap.
Niagara 6'x10 gage, 16" gap
Diebel Hi-speed and roll feed
Hydraulic Press 25 ton to 750 ton
Bliss Incl. #20 roller pin clutch
Ruesch #2 percussion press, 60 ton
DoAll continuous bandfiler Model HF
Riveting Hammers, high speed, #2A
Spot Welders 5 KVA to 100 KVA
Fatzer Foot Presses, #6, #8, #10, #12, #15
DoAll ML Contour saw

ROWBOTTOM Cam Miller

Sonntag Combination punch & shear #16 with notcher, M.D.

Watson Stillman 200 ton hobbing press with duplex pump.

THIS IS A PARTIAL LISTING—TREMENDOUS STOCK ON HAND—YOUR INQUIRIES WILL RECEIVE OUR PROMPT AND COURTEOUS ATTENTION

CAPITOL MACHINERY CORPORATION

253 CENTRE STREET **NEW YORK 13, N. Y.**

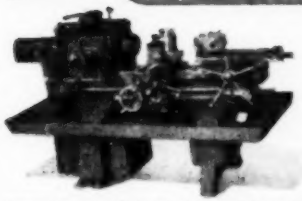
MDNA MEMBER

BUY FROM STOCK
Telephone
HAMILTON 8744-45

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



Warner Swasey #3 Universal Geared Head Bar Feed Ram Type Turret Lathe. Late Type. 3/60/220/440 volts motor. FIVE AVAILABLE—some have tooling.

TURRET LATHES

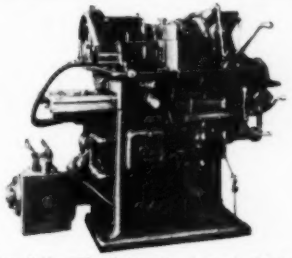
Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw Machine 1½ cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed, 1½"
W-Swasey #3 Univ. 1½" cap., M. Dr.
Gisholt #4 Univ. 2" cap., M. Dr.
W-Swasey #2A Univ. 2½" Cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.

Buffalo #0 Bending Rolls. Pinch Type, motor driven. With formers for bending angles, rounds, squares, pipe.
Buffalo #1 Wrapping Rolls. Motor driven. Capacity— 3½x3/8x9
Niagara Initial Type. 12'x1/16" capacity.
Webb #2L 5'x10ga. Initial Type Bending Rolls. 5 h.p.

Barnes #307 Single Spindle Hydraulic Twin Cylinder Vertical Honing Machine. Late Type complete with coolant system and 220/440 volts motors and controls. Six speeds, #5 morse taper. TWO AVAILABLE. One has Positive Depth Stop & Dwell Mechanism.

ENGINE LATHES

36"x30' LeBlond Geared Hd. Motor Dr.
32"x16' Bridgeford, Geared Head, M. Dr.
28"x10' Davis Quick Change Gear
26"x18' Bridgeford, Geared Head, M. Dr.
25"x14' LeBlond Motorized
24"x16' American Q.C.G. Grd. Hd. 11' centers, Taper Attach. Motor Dr. Equipment
24"x14' Lodge & Shipley, Motorized
24"x16' American Motorized
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
21"x18' LeBlond, Motorized
20"x11' Schumacher-Boyo, Q.C.G.
20"x10' American, Q.C.G. 72" centers
20"x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x8' Davis Q.C.G. 42" centers, equipment
18"x8' Lodge & Shipley, geared head
18"x8' Hendey Q.C.G. 49" centers
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, M.D.
16"x12' South Bend Q.C.G. Enclosed Head Under-driven with 1½ h.p. motor & controls. 105½" centers. NEW—1946. Has chuck, turret tool post, 2-steady rests, faceplates. Excellent condition. Immediate delivery from stock.
16"x8' Hendey Q.C.G. M. Dr.
16"x6' Lodge & Shipley Geared Head
16"x6' Lodge & Shipley "Patent Head", Motor Dr.
16"x6' South Bend Enclosed Head, Motor driven. Taper Attachment, Chucks, Collets & Quick Acting Collet Chuck.
14½'x6' South Bend Enclosed Head, Motor Driven. Taper Attachment, chucks, Turret Toolpost Threading Dial, Ram Type Turret Attachment, collets & Collet Chuck.
14"x8' Reed-Prentice Eight Speed Selective Geared Head, Q.C.G. Motor driven w/220/440 volts motor & controls. Has Taper Att. chuck, faceplates, steady rest, cabinet legs, max. centers —48". Completely rebuilt. Immediate shipment from stock.



Greenfield #12 Hydromatic Internal Grinder. Serial #11766. With Automatic Sizing Features. 7½ h.p. 3/60/220 volts motor.

GRINDING MACHINES

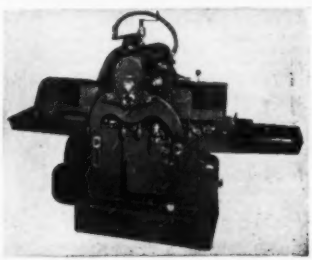
J & L #TG-615 Automatic Thread, M. Dr.
Norton 6x18 Vert. Surface, Excello Spindle
Norton 6x18 Horiz. Surface, Excello Spindle
Brown & Sharpe #2 Auto. Surface, 6x18
Pratt & Whitney 14x36 Vertical Surface
Blanchard #16, 26" Vertical Surface
Abrasive Automatic Surface 22x8
Reid #2 Automatic Surface, 6x18
Heald #25 Rotary Surface
Heald #70 Internal, Belt drive
Heald #60 Internal, Belt drive
Norton #2 Univ. Tool & Cutter, Belt Dr.
G & Livingston #4 Tool & Cutter
Cincinnati #2 Tool & Cutter, M. Dr.
Cincinnati "Monoset" Tool & Cutter
Cincinnati #2 Centerless, M. Dr.
Greenfield #12 Internal Hydraulic
Brown & Sharpe #10 Cylindrical 6x18
Brown & Sharpe #11 Cylindrical 10x30
Brown & Sharpe #4 Univ. Cylindrical 12x60
Brown & Sharpe #5 Plain Cylindrical
Oliver of Adrian #51 Drill Grinders
Thompson 6x18 Hydraulic Horiz. Surface. Wet & dry work. 220/440 motor driven. Auto. downfeed to head. Motor driven exhauster unit.
NEW—Leach 6x12 Horiz. Surface. 220 volts motor, ball-bearing Spdle. Permanent magnetic chuck. Immediate shipment from stock.
Norton 6x36 Horiz. Surface. 220/440 volts motor. Has extra grinding wheels and 40x9 chuck. For wet & dry work. Excellent condition.

AUTOMATICS

No. 0 & No. 00 Brown & Sharpe
No. 0 Brown & Sharpe Automatic Cutoff
#2G Brown & Sharpe High Speed Automatic Screw Machine. Serial #6814. Self-contained 5 h.p. 3/60/220/440 volts motor drive & controls. Complete coolant, toolposts, gears, collets. ONE AVAILABLE.
#2 Brown & Sharpe Automatic. Turner drive 220/440 volts motor. With Stock stands, collet, toolposts, coolant system, change gears.
Cleveland Model "A" 3¾" capacity Single Spindle Motor Driven Automatic. Has lot of tooling, collets, motors and switches & coolant system.

PUNCH PRESSES

200 tons capacity. 48" between strain bars.
Niles Bement & Pond Horiz. Hydraulic Wheel Press.
Bliss #18, #20, #20B, #21 O.B.I. Motorized.
Ferracute #86 Wide Frame, motor driven. 61½" between housings. 1¾" stroke.
Michigan O.B.I. 36 tons cap. 2" stroke. Wide Ram, wide Bed. Motor driven
Bliss No. 68C Dbl. Action, Gap Frame.
Lucas 15 tons, Power Arbor Press. M. Dr.
McCall No. 4 O.B.I. 2½" stroke, 25 tons.
NEW Johnson O.B.I. Presses. All sizes.
Bliss #305 Geared S.S. Single Action
Nilson 56 tons S.S. Dbl. Crank 3-Die Transfer Press
Rousselle #15 Horn Press. Motor Driven



Cincinnati #2-18 Automatic Horizontal Milling Machine. Late Type, Motor driven with motor and controls. Motor driven coolant system.

MILLING MACHINES

Nichols Hand, Late Type, M.D. (six)
Sundstrand #0 Rigidmil, M.D.
Whitney #6 Hand, Cone Drive
Hardinge B.B. Vertical, Bench
Becker #5C Vertical, Cone Dr.
Knight #1½C Vertical
Cincinnati #3 & #4 Vertical. Dial Type
Cincinnati #3, #4, #5 Pl. Horz.
Brown & Sharpe #12 Production. 18" Autom.
Brown & Sharpe #12 Production. 24" Autom.
Brown & Sharpe #0, 1, 1Y Horizontal
Kempsmith #1, #2 Plain Horiz.
Cincinnati 18" Mfg. Plain
Milwaukee #2K Vertical, M. Dr. H. Speed
Milwaukee #3K Vertical, M. Dr. H. Speed
Milwaukee #1½ Dbl. Overarm, Horiz.
Milwaukee #2B Dbl. Overarm, Horiz.
Milwaukee #3B Plain Horizontal
Pratt & Whitney #2 Duplex, Motorized
Cincinnati #0-8 Auto. Horiz. Some w/rise & fall spindle. FIVE AVAILABLE.
Cincinnati #0-8 Vertical. Motor driven. (EIGHT AVAILABLE)

UNIVERSAL MILLING MACHINES

Ames Bench, 12"x3"x7½"
Index #40H, 16"x8½"x16"
B & S #2, 20"x5"x13½"
B & S #1½, 20"x7"x18"
Bridgeport, 20"x9"x16"
B & S #1D, 24"x8"x15"
Garvin #2MU, 24"x8"x18"
K & T "Milwaukee" #2, 28"x10"x17"
Kempsmith #2, 28"x8½"x18"
Cincinnati #2, 28"x10"x18"
Cincinnati #2M, 28"x10"x18"
B & S #3, 34"x10"x21"
Cincinnati #3S, 34"x12"x20"
Some w/index heads & equipment

SHAPERS

Shaper—Columbia 32" B.G. Crank, motorized Power downfeed to head.
Shaper—Logan 7" Horizontal. NEW
Shaper—Machinery Sales 16", moterized
Shaper—Gould & Eberhardt 16", motorized
Shaper—Smith & Mills 16", motorized
Shaper—Smith & Mills 16" Universal
Shaper—Gould & Eberhardt 18" B.G. Crank
NEW—Gemco 20" Universal Shaper. M. Dr.
Shaper—American 24" crank, motorized
Planer—Shaper—Niles-B. Pond 20x20x24

DRILLING MACHINES

Cinci-Bickford 6' Arm, 15" col. Radial
Cinci-Bickford 5' Arm, 13" col. Radial
Fosdick 5'' Arm 14" col. Radial
American 4' Triple Purpose Radial, M. Dr.
Cinci-Bickford 3' Arm, 9" Col. Radial. Motor driven. W/table. 12 Speed gearbox.
Walker-Turner 36" Ball-Bearing Radial Drill, ½ h.p. 3/60/220/440 volts motor drive. Tilting Head and Swivel Arm. Universal Machine. Complete with stool bench.
Minster #2D Single Spindle Upright Heavy Duty 2½" cap. Compound Table. Motorized
Buffalo Forge #2MS Drill. Late Type
Leland-Gifford #2MS, 2-Spindle Upright
NEW Buffalo Forge #15, #18 Single Spdle.

LATEST TYPE NEARLY NEW MACHINES

BORING MILLS—Horizontal
CINCINNATI GILBERT 3½" bar, floor type, latest
DETRICK & HARVEY 4" bar, Floor Type, M.D.
GIDDINGS & LEWIS #22ST, 2½" Bar—latest
GIDDINGS & LEWIS #45—3" Bar—Table Type, latest
LUCAS #41, 3" bar, Table Type, Latest Type
NILES-BEMENT-POND 5", 6", 8", bar, floor type, M.D.
UNIVERSAL 3" bar, high speed, latest type

BORING MILLS—Vertical
BETTS 120", 2 swivel heads, AC, Motor Drive
BULLARD 16", 6 spindle Multaquatic, Latest Type
BULLARD 24", 36", 54" "Spiral Drive," latest
BULLARD 61" "Maxi-Miller," 2 heads, Motor Drive
COLBURN 72", 2 swivel heads, PRT, M.D.
KING 62", 2 swivel heads, PRT, M.D.
NILES 100", 2 swivel heads, PRT, DC, M.D.

DRILLS—Radial
AMERICAN 3' arm 9" column, "Hole Wizard," latest
AMERICAN 4' arm 11" Column, "Hole Wizard," latest
LELAND & GIFFORD #1LMS, 4 spindle, latest
LELAND & GIFFORD #2LMS, 6 spindle, latest

GEAR CUTTING EQUIPMENT
FELLOWS #61, #7, #7A, #72, #75, #77 High Speed Gear Shapers, latest type
FELLOWS #2, #2Z2, Gear Shaper, High Speed, latest
GLEASON 5", 12" straight bevel generator, Latest Type
GOULD & EBERHARDT #12H, #12HS Hobber, Latest
GOULD & EBERHARDT #36H, Hobber, with dif M.D.
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.
BROWN & SHARPE #1, 2, 3, Universal, Latest
BROWN & SHARPE #20, 16 x 18 plain, latest type
LANDIS 4x12, 4x18, Type H Plain Hyd., Latest
NORTON 6x18", 10x72", 14x36", Type C, Plain latest
NORTON 6"x30" type C, Plain Hydr., Latest

GRINDERS—Miscellaneous
BRYANT #16-CP-16, #24 Int. Hy., latest
CINCINNATI #2 Centerless "Filmatic," latest
CINCINNATI Centerless Lapper, Model ED, Latest
COVEL #22 Universal Tool & Cutter, Latest Type
HEALD 72A3, 72A5 "Gagematic," Internal, Latest
HEALD 75A, 72A3, 72A5, 74, 76A Internal, latest
LANDIS #12, Centerless, latest type

GRINDERS—Surface
HANCHETT Series 300, 12x18" Vert. spdle, Hyd, latest
HEALD #22 Rotary, 12" chuck, latest type
HEALD 27A—rotary, 16" and 20" chuck, hyd., Latest
THOMPSON 12x12x24 Type D Hyd., Latest Type
THOMPSON, 12x12x40 Type D Hyd., Latest Type

LATHES—Engine & Mfg.
AMERICAN 36"x96" centers, 2 carriages, motor drive
LEHMANN 16x36" centers, TIMKEN, latest type
LoSWING 4x60, 4x84, 8x60, 8x108, 5x34, Latest
MONARCH 10x20" centers, Model EE, Timken, latest
MONARCH 12x54" centers, Timken, Latest Type
MONARCH 16x78" centers, Timken, Latest Type
MONARCH 22"x156" centers, 3 carriage, Timken Bearing, motor drive
NILES 30x50" Boring, Timken, Latest Type
PRATT & WHITNEY 16"x80" centers, taper att., M.D.
SPRINGFIELD 60"x30" centers, Timken, latest type
WARD, HAGGAS & SMITH—18/30x66" centers gap.

LATHES—Turret
BARDONS & OLIVER #5, #7, Timken, Latest Type
FOSTER #4PU "Fastermatic" Timken, Latest
GISHOLT #1L, #2L, Universal, Timken, Latest
GISHOLT #3, #4, Univ, Timken, Latest
JONES & LAMSON #3, #5 Univ., Timken, Latest
LIBBEY "International" 1-HS, Univ., Timken, Latest
MOREY No. 2G, No. 3, No. 4, Timken Bearing, latest
POTTER & JOHNSTON #5D, #5D2E, Timken, latest
WARNER & SWASEY #2A Universal, Timken, Bar & Chucking, Latest Type (Preselector)
WARNER & SWASEY #1, 2, 3, Ram—Timken, latest

MILLING MACHINES—Plain
BROWN & SHARPE #2, Light Type, Timken, Latest
BROWN & SHARPE 2B, 3B, Timken, Latest Type
CINCINNATI 0-8 Automatic, Latest Type
CINCINNATI #4, Timken, Motor Drive
CINCINNATI 4-38, 2-18 Hydromatic, Simplex, Latest
KEARNEY & TRECKER #5, 4, Heavy, Timken, M.D.
KEARNEY & TRECKER 2H, 3H, 4H, Timken, latest
KEMPSMITH #3G, Timken, latest type
KEMPSMITH #4 Maxi-Miller, Timken, latest type
KEARNEY & TRECKER 2H, 3H, Timken, latest type
VAN NORMAN #12, 26, 36 Timken, latest
KEMPSMITH #4, Timken, latest type

MILLING MACHINES—Vertical
BROWN & SHARPE #2, Timken, latest type
CINCINNATI #2, #3, #4 Dial Type, Timken, latest
GORTON #3½D, 9J, high speed, latest
KEARNEY & TRECKER, 3H, Timken Bearing, latest type
REED PRENTICE 3VG, with or without hydraulic duplicator, Timken bearing, Latest Type

SCREW MACHINES—Automatic
BROWN & SHARPE #2G High Speed, Latest Type
CLEVELAND 9/16" model A, high speed, latest type
CONOMATIC 6" 4 spindle, latest type
CONOMATIC 2¾"—6 spindle, Latest Type
GOSS & DeLEEUW 8" auto. Chucker, 3 spin., latest

MISCELLANEOUS
AJAX 1½", 2", 3½" Forging and Upsetting, M.D.
BARNES #172, 306H, 307 Vert. Hone, Hyd., Latest
CAMPBELL #401 Abrasive Saw, Latest Type
CINCINNATI 1-30, 2-36 Duplex Vert. Surface Broach Double ram, Model EB, Hyd., Latest Type
CLEARING Type D8-1125-32 double action 125 ton Press, latest type
FOSDICK Model 42 Jig Borer, latest type
LAKE ERIE 500 ton Vertical Hydraulic Press, latest
MICHIGAN #1708A Cutter Reliever, Latest Type
PRATT & WHITNEY (KELLER) Type BL-2416 & Type G Copying, latest type, 2 & 3 Dimensional
PRATT & WHITNEY ½Rx50 Rifler, Latest Type
PRATT & WHITNEY 6 x 60 Thread Miller, latest
QUICKWORK ⅜" x 1" cap. Rotary Shear—M.D.

AVAILABLE FOR PROMPT SHIPMENT ***MOST BUILT AFTER 1941***

(Partial List) Over 2,000 Machine Tools in Stock. Your Inquiries Are Invited . . . Prompt Service Is Assured

MOREY MACHINERY CO., INC.
406 BROOME ST., NEW YORK 13, N. Y.
TELEPHONE: CANAL 6-5360
CABLE ADDRESS: WOODWORK, N. Y.

DALEY & SIBLEY
can supply you with
HARD-TO-FIND ITEMS
SAMPLES:

1. #2 CINCINNATI HIGH SPEED DIAL TYPE VERTICAL MILLER WITH ROTARY TABLE. late type.
2. #3 CINCINNATI UNIVERSAL DIAL TYPE MILLER COMPLETE WITH STANDARD EQUIPMENT.
3. #2 CINCINNATI CENTERLESS GRINDER. WITH IN AND OUT FEEDS. FILMATIC BEARINGS. late type.
4. #4D POTTER & JOHNSTON AUTOMATIC CHUCKING MACHINE. 1941. late type.
5. HANSON & WHITNEY THREAD MILLER. 8 x 16. late type.
6. #736 NIAGARA POWER SQUARING SHEAR. 3/16" x 36".
7. #13 A. C. CAMPBELL HYDRAULIC ABRASIVE CUTOFF MACHINE.
8. #13 BROWN & SHARPE UNIVERSAL AND TOOL GRINDING MACHINE.
9. #12 MARTIN HYDRAULIC MARKING MACHINE—late type.
10. #4 & #5 GISHOLT UNIV. TURRET LATHES. LATE TYPES. WITH EQUIPMENT.
11. 3/16" HI-PRO HI SPEED W.F. F. D.S.S.D. HEADER.
12. TYPE S BARBER COLEMAN GEAR HOBBERS—LATE.

DALEY & SIBLEY
Dependable Service
417 CHAPEL STREET **NEW HAVEN 5, CONN.**

NEW SURPLUS

SURFACE PLATES
12"x18", Hand Scraped, with Handles, Cover. Weight 70 lbs. PRICE: $29.50 each.

SURFACE PLATES
10"x14". Ground on All Sides, One Side Surface Plate, Reverse Side Lapping Plate. Weight 50 Lbs. PRICE: $15.00 each.

12" COMBINATION SQUARES
With Bevel Protractors Complete, Union. PRICE: $5.50 each.

VICTOR MACHINERY EXCHANGE, INC.
251 CENTRE STREET
NEW YORK 13, N. Y.
CANAL 6-5575

Eastern For • DEPENDABILITY • SERVICE • QUALITY REBUILDING

• LATE MODEL MACHINES • GUARANTEED EQUIPMENT

AUTOMATICS

No. 4D Potter & Johnston, m.d., latest
8 spindle 1⅝" Cone, m.d., latest
4 spindle ⅞" Cleveland, Model M, m.d.
4 spindle 1¼" Conomatic, m.d., bar, 1942 machine
No. 5D2—1⅝" Potter & Johnston, m.d., air chucks, 1944 machine
No. 6A Potter & Johnston, m.d.
No. 6C Potter & Johnston, m.d.
14" Fay, Flanders Type, m.d.
20x25" Jones & Lamson, m.d., latest
4 spindle ⅞" Model R-4 Acme-Gridley, m.d.
4 spindle 2⅛" Cleveland Model "K", m.d.
2⅛" Gridley Single Spindle, m.d.
2½" Cleveland Model A, m.d.
4⅛" Cleveland Model A, m.d.
4½" Cleveland Model A, m.d.
5½" Cleveland Model A, m.d.
6" Cleveland Model A, m.d.
7¾" Cleveland Model A, m.d.

HORIZONTAL BORING MILLS

No. 0 Giddings & Lewis, m.d., 3⅛" bar
2½" Cleveland, m.d.
No. 25T Giddings & Lewis, m.d., 2½" bar, latest
No. 31 Lucas, 3" bar, m.d.
No. 33 Lucas, 4½" bar, m.d.
No. 45 Giddings & Lewis, m.d., 5" bar
4" bar Detrick & Harvey Floor Type, m.d.
5½" bar Niles, m.d.
10" bar Sellers Floor Type, m.d.

VERTICAL BORING MILLS

24" Bullard New Era, m.d., with side head
36" Bullard Spiral Drive, m.d., with side head
36" Bullard New Era, m.d., with side head
42" Bullard New Era, m.d., with side head
42" Bullard Spiral Drive, m.d., with side head
42" Colburn H.D., m.d., 2 swivel heads
48" Cincinnati Rapid Production, m.d., 1 turret head, 1 swivel head
48" Colburn H.D., m.d., 1 turret, 1 swivel head
48" Putnam, H.D., m.d., 2 swivel heads
54" Colburn, m.d., 1 turret, 1 swivel head
84" Niles H.D., m.d., 2 swivel heads, p.r.t.
100" Niles Heavy, m.d., 2 swivel heads, p.r.t.
120" Niles Heavy, m.d., 2 swivel heads
100" Niles Extra Heavy, 2 swivel heads, m.d., late

GEAR HOBBING MACHINES

Barber-Colman Model T, m.d., latest
No. 12H Gould & Eberhardt Universal, m.d.
No. 34 Brown & Sharpe, m.d.
No. 36H Gould & Eberhardt, m.d., with infeed attachment for worm gears
No. 44 Brown & Sharpe Spur & Spiral, m.d.
48" Cleveland, m.d.

GEAR CUTTERS

No. 3—26" Brown & Sharpe, m.d.
No. 4—48" Brown & Sharpe, m.d.
Gleason Spiral Bevel Gear Rougher, s.p.
3" Gleason Straight Bevel, m.d.
8" Gleason Straight Bevel, m.d.
11" Gleason Straight Bevel, m.d.
12" Gleason Straight Bevel, m.d.
Cincinnati Gear Burnisher, m.d.
No. 1 Brown & Sharpe Spur Gear Tester
Cross Gear Tooth Rounder, m.d., 9" cap.
National Broach & Machine Co. Red Ring Gear Speeder, 10" cap.
Gleason Gear Tester for hypoid gears

CENTERLESS GRINDERS

No. 2 Cincinnati, m.d., Filmatic Spindle, latest
No. 2 Cincinnati, m.d., older type
Long bar attachment for No. 3 Centerless
Cincinnati Valve Seat Grinder, cap. ⅝" valve stems, m.d.

CYLINDER GRINDERS

No. 50 Heald Hydraulic, m.d., 11—18" spindle
No. 55 Heald, m.d., 15—24" spindle
No. 73 Heald Airplane Cylinder Grinder, m.d., brand new, latest type

PLAIN CYLINDRICAL GRINDERS

No. 5—3x18" Brown & Sharpe, m.d., latest
6x18" Cincinnati Hydraulic, m.d.
6x18" Landis Type C Hydraulic, m.d., late
6x18" Landis, m.d.
6x30" Cincinnati Hydraulic, m.d.
6x32" Fitchburg Type A, m.d., late
8x18" Cincinnati Saddle Type, m.d.
8x36" Cincinnati Saddle Type, m.d.
No. 10 Brown & Sharpe Self-Contained, m.d.
No. 11 Brown & Sharpe Self-Contained, m.d.
10x24" Landis, m.d.
10x36" Cincinnati Hydraulic, m.d.
10x48" Brown & Sharpe, belt
10x72" Brown & Sharpe, belt
10x72" Landis, m.d.
12x36" Landis, m.d.
12x48" Cincinnati Plain Self-Contained, m.d.
12x48" Cincinnati, with spline grinding attach.
12x48" Modern, belted m.d.
12x96" Landis, m.d.
14x18" Cincinnati, m.d.
14x18" Cincinnati, Self-Contained, m.d.
14x52" Norton, motorized
16x48" Landis Type D, m.d., latest
20x120" Landis Self-Contained, m.d.
24x120" Cincinnati Self-Contained, m.d., late type
26x96" Landis Self-Contained, m.d.

UNIVERSAL CYLINDRICAL GRINDERS

14x36" Fitchburg Hydraulic Spline, m.d., latest
12x24" Cincinnati Self-Contained, m.d., latest mechanical type
No. 2—12x30" Brown & Sharpe, belt
12x30" Landis Hydraulic, m.d, late type
12x36" Cincinnati Self-Contained, m.d.
12x36" Cincinnati, belt
12x48" Cincinnati, arranged for spline grinding
12x48" Cincinnati Hydraulic, m.d., latest type
12x48" Norton, m.d., latest
16x48" Cincinnati, belted m.d.
18x48" Cincinnati Hydraulic, m.d., latest

DISC GRINDERS

No. 4 Gardner Disc, m.d.
No. 20 Gardner Comb. Disc Grinder & Roll Sander, m.d.
7½ H.P. Standard, m.d., new
7½ H.P. U.S. Elec. Tool Co. Disc Grinder, md., new

INTERNAL GRINDERS

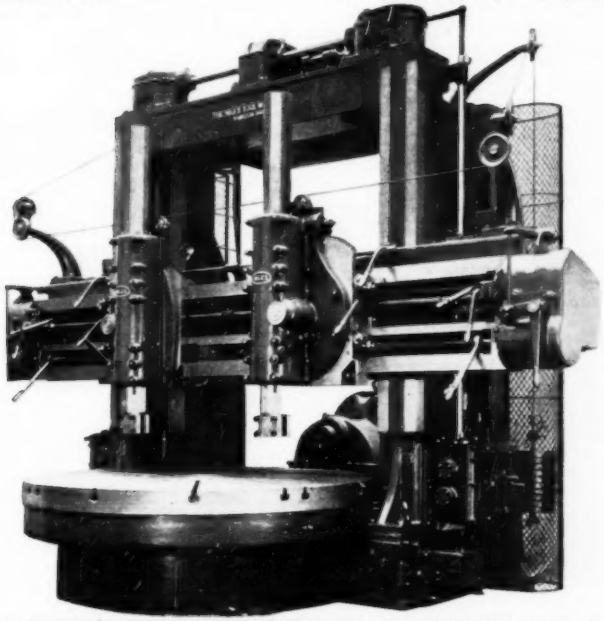
No. 16A—16" Bryant, m.d., latest
No. 16—22" Bryant, m.d., latest
No. 16RS Bryant, m.d., latest
No. 16—38" Bryant, m.d., latest
No. 6, 10, 20 Bryant, belt
No. 24—21" Bryant, m.d., late
No. 24-36 Bryant, m.d., latest
No. 49 Heald Single End Borematic, m.d.
No. 70 Heald, belt
No. 72A Heald Plain, m.d.
No. 72A3 Heald Sizematic, m.d.
No. 72A3 Heald Gagematic, m.d.
No. 72A5 Heald Sizematic, m.d.
No. 72A5 Heald Plain, m.d.
No. 72A5 Heald Plain, long bed type, m.d., latest
No. 73 Heald Airplane Cylinder, m.d., brand new, latest
No. 74 Heald, m.d.
No. 172 Heald Gap, m.d., brand new, latest type
No. 174 Heald Gap, m.d., latest
No. 649-16 Van Norman Automatic Oscillating Radius, m.d., latest
Series 5 No. 5 Bryant, m.d., latest

BROACHING MACHINES

No. 4 Oil Gear Hydraulic, m.d., 64" stroke
No. 4 LaPointe of Hudson, gear box
No. 75 H.P. LaPointe Horizontal Hydraulic, 150" stroke, 37½ tons cap.
Cincinnati Mill Broach, m.d., 10" spindle, new

BALL BEARING DRILLS

2 spindle 21" Canedy-Otto, m.d., No. 4 Taper
No. ½, 1, 2 Avey, belted m.d.
No. 1B Edlund, m.d., new



NILES 100" EXTRA HEAVY BORING AND TURNING MILL WITH WESTINGHOUSE 40 H. P. 230 VOLT D.C. MOTOR. MACHINE HAS TWO HEADS ON RAIL AND POWER RAPID TRAVERSE.

We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Let us quote on your requirements.

THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

More For Less . . . HERE!

GRINDERS—Surface

Gallmeyer & Livingston #5 Hyd. 12"x36" (late)
Gallmeyer & Livingston #45 Hyd. 12"x24" (late)
(3) Abrasive #3, 22"x8"x12" Automatic M.D.
Diamond #28, 36"x12"x12" Automatic, M.D.
Pratt & Whitney 14" and 22" Vertical, M.D.
Blanchard #11 Rotary 16" Mag. Chuck (very late type)
Blanchard #16, 16A High Power 30" chucks

Universal, Plain & Internal

Brown & Sharpe #13 Univ. & Tool, attchmts. (late)
Covel #22 Univ. Cutter & Tool, attchmt (late)
Brown & Sharpe #2 Univ. Cylindrical (very late type)

Cincinnati #2 Filmatic Bearing, Centerless, long bar attachment & automatic infeed attachment
Cincinnati #3 Centerless M.D.

Norton 10"x18" & 10"x36" Type C Plain Mech. Feed (late)
Brown & Sharpe #5, 4"x18" Plain (late)
Bryant 5A Hole & Face, Pneumatic Chucking (late)
Heald 70A Mech. Feed, 3 motor drive, internal
Heald 75A Hand Feed, 2 motor drive, internal

LATHES

Pratt & Whitney 16"x36" Model B, 16 speed
Reed-Prentice 18"x8' Model B 54" C.D. (1942)
Hendey 14"x6' E.C.M. 18-speed
Hendey 28"x12' 9-speed Gr. Hd. 7' 10" C.D.
American 30"x16' 12-speed Gr. Hd. Med. Pattern High Duty 8' C.D.
American 36"x25' 12-speed Gr. Hd. Med. Pattern High Duty 15' C.D. 2 carriages
Bridgeford 36"x14' 9-speed Gr. Hd. 7' C.D.
Bridgeford 36"x56' Gr. Hd. 48' C.D. Mtrd. carriage
Niles-Bement-Pond 48"x24' Gr. Hd. 18' C.D. Mtrd. carriage
Seneca Falls 14½"x16' Short Cut (late)
(2) Lipe Rollway 12"x18" Semi-Auto. Carbo (late)
Sundstrand #6—8"x15" Auto. Stub (late)
Sundstrand #10—10"x22" Auto. Stub (late)

GEAR CUTTERS

(2) Gould & Eberhardt 36"x12" Auto. Spur
Gleason 3" straight & Bevel Gear Generator attchmts (late)
Fellows #72 High Speed External & Internal (late)
Fellows #6 & #63 Spur and Helical M.D.

TURRET LATHES (late type)

Jones & Lamson #5 Ram Type, bar equip., 3" hole
(2) Bardons & Oliver #3 Univ., Bar equip., 1⅞" hole
Foster #5 Ram type Univ., bar & Chucking, 2¼" hole
Gisholt #5 Univ. Pre-Selec. Hd., chucking
Simmons #26 B. G. Micro-speed, 1½" hole

MILLING MACHINES—Universal

Pratt & Whitney, Keller, type BL-2416 Duplicator, 3 dimensional, complete with angle plate and control cabinet

Brown & Sharpe #2 Light Type, Attchmts (late)
Brown & Sharpe #1½A, #2A Constant Speed Drive type
Van Norman 2SU Rect. Overarm, attchmts (very late)
Van Norman 36SU Ram Type, attchmts (late)
Cincinnati #3S Rect. Overarm, motor in Base, attchmts

Vertical

Brown & Sharpe #2 Light Type
K & T (Milw.) #2K High Speed
Cinn. #3 Dial Type, Medium Speed
Cinn. #3 High Power Rapid Traverse M.D.
Cinn. #1M & 2M Pyramid Column motor in base

Pratt & Whitney #1½B Jig Borer, Serial #M1628-149, Tooling Rotary Table (very little use)

Plain & Production

Brown & Sharpe #1, 1½, 2 constant speed drive type
Brown & Sharpe #3B Dbl. Overarm, motor in base
(2) Brown & Sharpe #12 Automatic (late)
Van Norman #36 Ram Type (very late)

Keyway & Spline Miller

Ingersoll-Rand 2-spindle Openside Planer Type 18"x12' Table, 12 table feeds—10' max. table travel—8 spindle speeds.

BORING MILLS

Universal 4" bar Triway Table Type 12" Extra Vertical Range (late)
Defiance 25A—3½" bar—extra vertical & cross range (late) measuring rods & indicators
Yoder #3A 3" bar (late)
Bullard 24", 36" Spiral Drive

SHAPERS

Hendey 12" Univ. Timken Bearing (late)
Cincinnati 16" Univ. (late)
Gould & Eberhardt 24" "Invincible"
Gould & Eberhardt 16" High Duty, B.G., M.D.
Hendey 32" B.G., Timken Bearing, Rapid Traverse to head

MISCELLANEOUS

NEW—Rafter Shears—2 sizes—immediate delivery
¼"x10' mild steel
¼"x10' Stainless Steel
3/16x12' Mild Steel
3/32"x12' Stainless Steel

Campbell #302 Hyd. Abrasive Cut-Off (late)
Bliss 2-high 19" Cold Rolling Mill (extra set of rolls)
80' Boom Derrick with 2 hoists, 10-ton cap.
Rollaver 60"x60"x10" Hand Ram Power Draw, Mach. 1942

Footburt #2—12" 6-spindle Super Sensitive Power Feed Drilling Machine (very late type)
Leland-Gifford #3 Belted 2 and 4-spindle Power Feed Drilling Machines M.D.

National 3", 5", 7½" Upset Forging Machine
Standard 1200# Board Drop Hammer (1943)

6 NEW—York 4-oz. Plastic Injection Molding Machines, Control panels, 20,000# P.S.I., Injection pressure 5" dia. cap. per hr, Immediate delivery from stock.

Chances are the machine you need is not listed here. Write, wire or phone—tell us your needs—our engineers will gladly help you solve your machine tool problems.

Botwinik Brothers
of Mass., Inc.

BROACHES

3 ton American vertical
No. 1 Foote Burt duplex surface
9 ton American horiz. surface
Twin 10 Oilgear duplex
No. 3XA Oilgear
30 ton No. V48 American vertical
No. 3 Lapointe screw type

RADIAL DRILLS

3' Morris
4' Hammond elbow arm
4' Cint. Bickford universal
6' Dreses
6' Cincinnati Bickford
7' American triple purpose

GEAR CUTTERS

Nos. 3, 12 & Type T Barber Colman
Nos. 8H, 12H & 16 HS Gould & Eberhardt
No. 130 Cleveland Rigidhobber
Nos. 1, 5A & 5AC Lees Bradner
No. 5M Adams Mfg. hobber
12" Reed Ring gear shaver
8" Red Ring gear lapper
18" Gleason bevel tester & lapper
24" Flather auto. spur
No. 6 Fellows gear shaper
Cimatool gear chamferer

GRINDERS

Nos. 1 & 2 Brown & Sharpe universal
6"x18", No. 10 B. & S. Elec. hydraulic
10"x18" & 14"x36" Landis hydraulic
10"x36" & 23"x36" Norton hydraulic
Nos. 10 & 18 Blanchard rotary surface
12" & 16" No. 22 Heald rotary surface
16" & 24" No. 25A Heald rotary surface
10x24 Norton hydraulic surface
12"x48" Thompson hydr. surface
14"x60" Mattison hydr. surface
53", No. 372 Gardner horiz. disc
No. 115 Gardner opposed disc
30", No. 230 Hanchett opposed disc
Nos. 72A3 & 72A5 Heald internal
No. 18A18 & 24-36 Bryant internal
No. 2 Cincinnati centerless
Nos. 33 & 35 Excello thread
No. 2 Norton tool & cutter

LATHES, TURRET

No. 2 FU Foster Fastermatic
24" & 42" Bullard vertical
Nos. 2, 3, 4, 1A & 3A Warner Swasey
Nos. 4 & 3AL Gisholt
Nos. 8, 2 Denver universal
Nos. 2G & 3 Morey
No. 601 DD Oster
Nos. 5 & 7 Bardons & Oliver

MILLERS, MFG.

24" & 48" Cincinnati duplex
No. 3—36 Cincinnati Hydromatic duplex
No. 18-36 Kearney & Trecker duplex
Nos. 1-12, 1-18, 2-18 & 2-24 Cincinnati automatic
Nos. 3-24, 4-36, 4-38, 5-60, 56-72 & 56-90 Cincinnati Hydromatic
Nos. M18, M24 & 12-24 Kearney & Trecker
Nos. 1, 1M & 3 Kent Owens
30", 42" & 84" Ingersoll Rotary
No. 00 Cincinnati, horiz. vertical or rise & fall
Nos. 4, 40 & CT36 Lees Bradner thread
Types C & D Hall Planetary

PRESSES

No. 2½ Toledo OBI
Nos. PA4 & CA4 Ferracute horning
Nos. 1½ & 1½C Bliss cam drawing
42", No. 90E Toledo double crank
Nos. 304 & 75½ Bliss straight side
No. 56 Toledo straight side
350 ton Clearing No. F1350-42
600 ton Hamilton No. 2316½
700 ton No. 7C Ajax forging
75 ton Southwark hydraulic
300 ton French Oil hydraulic
500 ton Clearing hydraulic

MILES MACHINERY CO.
SAGINAW, MICH.

LATE TYPE MACHINES

5' - 13" Cincinnati - Bickford Super - Service Radial
24" Cincinnati-Bickford Super-Service Upright Drill
#3H Milwaukee Plain Miller
#1-18 Cincinnati Production Millers
#3MS Cincinnati Plain Miller
#174 Heald Internal Grinder with gap to swing 54"
#16-Y-28 Bryant Internal Grinder
10"x48" Norton "C" Grinder, oscillating wheelhead
#2 Cincinnati Filmatic Centerless Grinder

HAZARD BROWNELL
350 Waterman St., Providence 6, R. I.
Dexter 8880

National Bent Shank Nut Tappers Battery of 5/8" to 1" Machines.
Waterbury-Farrel Fdry. 5/8" and 1" D.S. S.D. Cold Headers, also Thread Rollers.
Fisher 5" Bar, Floor Type Boring Mill. New in 1942.
Niles, Bement, Pond 60"x60"x24' table 4-Head Planer, Rev. D.C. M.D.
Bliss Presses in all sizes up to 1,000 ton capacity.
Wire Working Machinery.

National Machinery Exchange
128-138 Mott St., New York 13, N.Y.

LATE TYPE MACHINERY AT OLD TIME PRICES

AUTOMATICS

Brown & Sharpe #96G, H.S. (8) #4, #6
Conomatic 8 sp. 1⅞" cap.

BORING MILLS

Giddings & Lewis #6, #25T
Lucas #31 horiz.
Universal 3" horiz. equipped
Bullard 24", 42" New Era V.T.L.

DRILLS AND RADIALS

Barnes #262, Buffalo 18", 1" capacity
Cinci-Bickford Sup. Ser. 21", 24".
Delta Bench & Floor Models single & 4 spindle
Royersford Excelsior 21" B.G.
Sibley 24—28" Latest
Natco Model E-5 Multi-Spindle
American Hole Wizard 3'-9" col., 4'-11" col.
Canedy-Otto 3'-9" col.
Carlton 8'-19" col.

ENGRAVERS

Gorton #3U, 3Z 2 dimensional; #3L, 3 dimensional
Gorton Cutter Grinders

GEAR EQUIPMENT

Fellows #72, 725 High Speed
Mikron Gear Hobber
National Broach Checker; Michigan Gleason

GRINDERS—Miscellaneous

Brown & Sharpe #5 cyl., 3"x18"
Brown & Sharpe #2, #3 Univ., #13 Univ. & Tool
Cincinnati #2 Centerless Filmatic, 12"x36 Univ.
Covel #91A Univ. Tool & Cutter
Excello #44 Carbide, Hammond #4
Gardner #226, 30 disc. Heald #1 Tool
K.O. Lee Tool & Cutter
Landis #4M Cyl. 4x12"
Landis #6 Thread & Centerless
Norton #2 Tool & Cutter
Norton Cyl. 6x18" Type C, 6x30" Type C
Oliver #510 Drill Pointer, Sellers #4G
Pratt & Whitney Radius #R6
Black Diamond #4 Drill
Porter Cable Belt WG8, G8

GRINDERS—Surface

Abrasive #11/2" Wet Hand Feed, #34 Vertical
Atlantic 6x18" Power Feed
Brown & Sharpe #2, #5 Hyd. 8x24" Cap.
G. & L. #18, 6x18" Hand Feed, #25, #35 Hyd.
Hanchett #300, 13x48"
Mattison 14x16x48" Hyd.
Norton 6x18" Hyd.
Reid #2A P.F., #2C Pope Spdl Hand
Pratt & Whitney 12x36" Vert.
Thompson Hyd. 6x10x18", 6x12x18

LATHES

Hardinge Precision 9"
Hendey G.H. 12x30", 16x30
LeBlond Regal 10"x31/2", 15x30", 19x42", 21x60"
LeBlond Heavy Duty 16x30"
Ledge & Shipley 16x78" T.A.
Monarch 10"x20" EE, 16x78" T.A.
Rivett Precision, Logan 10"x30"
Sebastian 12"x4' G.H., Sheldon 11x24", 1" collet
South Bend 9"x3', 9"x31/2', 13x36", 16"x7'
South Bend 10" Toolroom 1" collet capacity, T.A.

LATHES—Turret

Acme #6W Bar & Chuck
Bardons & Oliver #3, #5, Foster #3B
Brown & Sharpe #1, 2F Hand Screw Mach.
Gisholt #4, 5 Bar & Chuck
Hardinge ESM Second Operation
Jones & Lamson #8A Univ. Saddle Type
Oster #60i Rapiduction, Mercy #3, 1½" cap.
Warner & Swasey #3 Universal, #4 Pre-Selector

MILLS—Plain & Universal

Brown & Sharpe #2 Pl., #2A Univ.
Burke #4 Plain & Univ. Vert. Hd.
Cincinnati #3 Plain
Milwaukee #2HL, 2H Plain
Milwaukee #2H, 3H Univ.
Van Norman #12, 36

MILLS—Vertical

Bridgeport vertical with Slotting Attach.
Brown & Sharpe #2
Cincinnati #4 Dial Type
Kearney & Trecker #5H
Gorton #8D, 9J Plain
Gorton #8½D, 9J Duplicator Fully Equipped
Fosdick Jig Borer #42 Like New
Sip Jig Borer #MP-5
Morey #12M Profiler 2 sp.—Pratt & Whitney 12B

MILLS—Production

Brown & Sharpe #000, 12, 2I
Cincinnati #1-12, 2-18 Mfg.
Kent Owens #1V, 2-20
Nichols Hand, Vert. Hd., U.S. MM 1
Van Norman Production

PRESSES

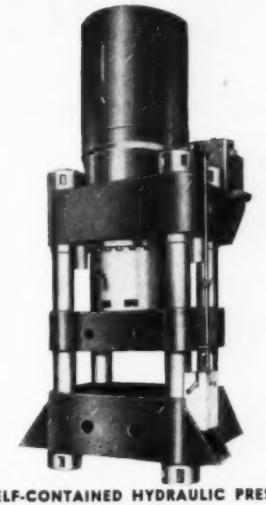
Bliss #8 Dbl. Crank, Bed 42x100"
Bliss #675 Hi-Production
Bliss #2I O.B.I., #4½ Double Action Cam
Bliss #58 O.B. Gap Frame #62, 62A, 162 SS
General Flexible Elec. Screw
Henry & Wright 25, 60, 75 Ton Dieing
Thomas 80 Ton O.B.I., Diamond #3I O.B.I.
Toledo 400 Ton Knuckle Joint #663
V. & O. #25S O.B.I., #102 Reducing
Z & H 30 Ton O.B.I.

MISCELLANEOUS

BAND SAW: Tanewitz #36M
BENDING ROLL: Buffalo #0, ½, Excelsior #14
EYELETTER: Peerless #226
FILER: Oliver, HEAVY DUTY
HACKSAW: Marvel #6A Automatic, #6, #8B
HARDNESS TESTER: Rockwell 4JR, Clark
HAMMER: Niles Bement Pond 2500 lbs. steam
HAMMERS: Rochester Rivetting, Hi Speed
HONER: Micromatic #H-1
INJECTION MOLDER: Reed-Prentice #10D6, 6 ounce

NEW IN STOCK

Air Hydraulic Presses—Arbor Presses #6C Famco, ⅓ off list price—Band Saws Kalamazoo 8x16", 8x24"—Drill Presses all sizes—Grinder Surface, Abrasive #11/2—Hydraulic Press Northern 20 Ton—Injection Molders, 1, 3, ounce—Power Presses, Famco 4½, 7½ Ton, Rousselle O.B.I. & Horn 5, 10, 15, 25 Ton, Pressrite OBI, 5, 10, 12, 18, 30 ton cap.—Shaper, 7" Ammco, 8" Shaprite, Sheldon 12"—Shears, Foot 22" to 8', 16 & 18 ga., Shears, Power, 3'x18 gauge to 10'x10 ga.—Welders, Arc Seam, Spot all sizes—Vert. Milling Attach. Halco, HS 5 & 10 Speed—Motors, Grinders, Buffers, all



SELF-CONTAINED HYDRAULIC PRESS

HYDRAULIC EQUIPMENT

Cap.	Manufacturer	Platen	Stroke	Opening
500 Ton	Lake Erie	35x36"	36"	68"
600	Bald. S'thw'k	76x59"	22"	30"
500 D.A.	H.P.M. (160 Cushion)	36x36"	24"	30"
1000	French Oil	53x42"	20"	50"
300	Brand New Watson Stillman Hobbing Press			
375 D.A.	Elmes (60 Cushion)	84x44"	12"	42"
350	Verson	40x40	36"	72"
50	Dennison	22x20	18	23
150	Southwark	34x30	30 2' to 4'	

UP MOVING RAM PRESSES

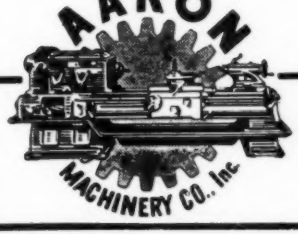
50 & 100 Ton Stokes Molding Presses & Pumps
300 Ton Dunning & Boschert Molding Press
500, 800 Ton Waterbury-Farrel 3 & 4 Rod Presses, 6 & 6½" strokes
300 Ton Watson Stillman Press, 24x20" Platens
400 & 500 Ton Shaft Straighteners—Self Contained

All Hydraulic Equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your Hydraulic problems.

IRONWORKER: Buffalo 25U
KEYSEATER: Davis #4, Mitts & Merrill, Baker
PLASTIC GRINDER: Bell & Jewel, Cumberland
PRESS BRAKE: #253, #335 Chicago, 8L10
ROUTER: Onsrud #W240, #55
SHAPER: 8" Shaprite, Ammco, Atlas
SHEAR: Pexto, 6'x14 Ga. Power
SHEAR THROATLESS: #138 Lenox
SPEED LATHES: Cincinnati, Schauer
TAPPERS: Bakewell #1
TAPPERS: Haskins #2C, 3C
THREAD ROLLER: Waterbury-Farrel #30 with Dies
WELDERS: Sonn; Thompson
WELDERS SPOT: Taylor-Winfield 50 KVA, Sciaky

THIS IS ONLY A PARTIAL LISTING. WHY NOT SEND US YOUR INQUIRIES

WRITE FOR OUR FREE ILLUSTRATED CATALOG



AARON MACHINERY CO., Inc.

45 Crosby Street
WOrth 4-8233

New York 12, N. Y.
Cable: AARMACH, N. Y.

MDNA MEMBER

MACHINE TOOLS

All New Since 1940

BOREMATICS

- #48A Heald Single End
- #49 Heald Double End
- #49 Heald Universal Single End

GRINDERS

- #2 Brown & Sharpe Universal
- #13 Brown & Sharpe Universal & Tool
- 6" x 15" J & L External Thread
- 12" x 5" J & L Internal Thread
- #2 Cincinnati Centerless
- #95—86" Bridgeport Face

LATHES

- 27" x 48" LeBlond Geared Head
- 25" x 120" LeBlond Geared Head
- 42" x 108" Niles Geared Head

SCREW MACHINES

- Model #60 New Britain-Gridley Six Spindle
- 4⅜" Cone Four Spindle

MILLERS

- #2-18 Cincinnati Plain Automatic
- #4-38 and #5-48 Cincinnati Hydromatic
- #1854 Kearney & Trecker Simplex
- #2SP and #3SP Van Norman Plain
- #26 Van Norman Ram Type Plain
- #3 Cincinnati High Speed Dial Type Plain
- #5H and #5HM Kearney & Trecker Plain
- #3SU Van Norman Universal
- #2 Cincinnati Dial Type Vertical
- #2 Standard Brown & Sharpe Vertical
- #3 Cincinnati Dial Type Vertical
- #4 Reed-Prentice Vertical Miller & Die Sinker
- 4½" x 12" Pratt & Whitney Model C Thread
- #10CT Van Norman Hydraulic Dual Head Contour

PLANERS

- 36" x 36" x 16' Cincinnati Hypro Openside—1941

TURRET LATHES

- #5U Foster Universal Geared Head
- #1 and #4 Warner & Swasey Universal Geared Head
- #1A Warner & Swasey Universal Geared Head
- #1L Gisholt Universal Geared Head
- #7A J & L Universal Geared Head

WIRE — PHONE — WRITE

J. L. LUCAS & SON, INC.

P. O. BOX 3006

BRIDGEPORT 5, CONN.

UNUSUAL VALUES

Milling Machines—No. 1, Universal. No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x16", Surface 12"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—16"x6', 8', 10'—18"x6', 8', 10'—26"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 19" and 18" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—3"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 5¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 3" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.

P. O. Box 88, Columbus 16, Ohio

MACHINES IN STOCK

FOR IMMEDIATE DELIVERY

No. 112-C Excello Diamond Boring Machine, Sgl End, Dbl Spindle; Heavy Duty Spindles with Hydraulic Chucking Mechanism: Late Type

No. 12-H Gould & Eberhardt Universal Gear Hobbers for Spur and Bevel Gears; Equipped with Differential Mechanism; Outer Supports; M.D.

No. 13 Gleason Universal Gear Testers for Spur, Helical, and Bevel Gears; Late Type, Motor Drive with 4-speed AC Motor; Overarm: Excellent Cond.

No. 4 Cincinnati High Power Universal Mill; Timken Bearing, Rectangular Overarm, Power Rapid Traverse, Dividing Head, Vert. Attachment, M.D.

No. 3 Cincinnati Plain Mill; Timken Bearing, Rectangular Overarm, Power Rapid Traverse, Motor in Base

HOWARTH Machinery Co.

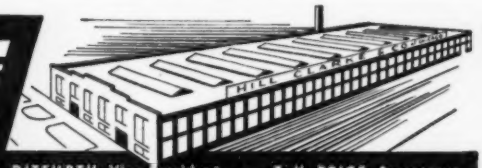
505 E. 9 Mile Road, Detroit 20, Mich.

Phone JOrdan 4-6490

No. 4 Cinn. Vert. High Power Mill.
Nos. 0G & 2G B & S High Speed Automatics.
Davenport Model B Automatic.
No. 13 B & S Univ. Grinder, M.D.
No. 2A W & S Turret Lathe.

D. E. DONY MACHINERY CO.
47 Laurelton Rd., Rochester 9, N. Y.

HILL-CLARKE MACHINERY COMPANY



ESTABLISHED 1867 • H. W. MONS, President • W. L. DITFURTH, Vice-President • T. H. PRICE, Secretary

COLBORNE MANUFACTURING CO., CHICAGO maker of Pie Baking Machinery has for 38 years bought Hill-Clarke machines. Some of them are still in use after 30 years. WALTER SHAPCOTT, SUPT. says "We have found that the reliability and long performance of Hill-Clarke machines prove their economy over ordinary second hand machines."

AUTOMATICS

No. 2 Brown and Sharpe
1¼" Greenlee, 6 Spdls. (1941)
No. 61 New Britain 6 Spdls. 1⅝" (1942)
No. 6 Brown & Sharpes
No. 49 New Britain, 4 Spdl. chucker
Model A 2½" Cleveland

DRILLS

Model A 3¾" Cleveland
No. 15G Baker
No. D8 Colburn No. 6 Morse Taper
No. 1LMS—20"—5 Spdl. Leland-Gifford
No. 2LMS—26"—1 Spdl. Leland-Gifford
No. 2LMS—14"—3 Spdl. Leland-Gifford
No. 2LMS—26"—4 Spdl. Leland-Gifford
No. 2LMS—26"—6 Spdl. Leland-Gifford
No. 3B—24"—6 Spdl. Edlund (1942)
No. 42L Natco 36 Spdls.
6'-17" Col. Fosdick Radial
7'-15" Col. American Full Universal

GEAR MACHINES

No. 61 Fellows Gear Shaper (1942)
No. 61-A Fellows Gear Shaper
No. 7125 Fellows (1943)
No. 712 Fellows Auto Indexing (1943)
No. 72 Fellows Gear Shaper
No. 16 HS Gould & Eberhardt
No. 18H Gould & Eberhardt
No. 6 Gleason Gear Tester
12" Gleason Bevel Gear Cutter
72" Cincinnati Gear Cutter

HORIZONTAL BORING MILLS

No. 31 Lucas, 3" bar
No. 46-B Heald Bore-Matic
No. 112—C Excello 2 Spdl.

GRINDERS

3"x12" Brown & Sharpe No. 5
4"x12" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x18" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x48" Norton Type C Plain (1943)
Norton Motorized Grinders
6"x18" —— to —— 24"x240"

No. 5—8"x24" Covel Hydr. Surf. (1941)
No. 36-A Hanchett Rotary Surface

FOR YOUR PROTECTION ONLY HILL-CLARKE OFFERS YOU THIS 5 WAY GUARANTEE

1. A responsible organization—82 years experience.
2. Modern machines — no worn out equipment.
3. Every machine remanufactured or carefully inspected by experienced craftsmen.
4. You can see your machine tested under power before purchasing.
5. Hill-Clarke's unconditional money-back guarantee.

72A-3 Heald Internal Grinder (1942)
72A-5 Heald Internal Grinder (1942)
74 Heald Internal Gdr. (1942)
No. 5 Bryant Internal Grinder (1942)
No. 16-16 Bryant Internal Gdr. (1942)
No. 16-36 Bryant Internal Grinder (1942)
No. 24-24 Bryant Internal Grinder (1941)

LATHES

15"x5' Sebastian, Grd. Head
16"x54" centers LeBlond (1941)
16"x60" centers Pratt & Whitney, Model B
16"x6' American, Grd. Head
19"-38" gap x 10' LeBlond
36"x30' Lodge & Shipley
36"—48"x16' Lehman Hydratrol (1945)
48"x20' centers Simmons (1942)
50"x17' centers LeBlond (1942)

LATHES (Production)

8"x15" Sundstrand, Model D (1943)
10"x16" Sundstrand
10"x22" Sundstrand, Model AA (1943)
16"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)
R—14 Seneca Falls Lo-Swing

MILLING MACHINES

No. 4 Cincinnati Plain (1943)
No. 2 H Milwaukee Vertical (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Cincinnati H.P. Vertical
No. 1-16 Cinn. Mtg. (1940)
No. 2—18" Sundstrand-Electromill (1942)
No. M-24 Milwaukee Simplex (1942)
38"x40"x10' Fitchburg Duplex Miller (1943)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 34-48 Cincinnati Hyd. Duplex
No. 45-48 Cinn. Hyd. Plain Tracer (1942)
No. 56-72 Cincinnati Hydromatic
4"x9" Hanson-Whitney Univ. Thrd. Miller
4½"x12" Pratt & Whitney, Model C
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x80" Pratt & Whitney Thread
6"x132" Pratt & Whitney Thread Miller
8"x168" Pratt & Whitney Thread
10"x48" Hanson-Whitney Thread
24"x24"x12' Ingersoll Adj. Rail
36"x36"x16' Ingersoll Slab Miller
No. 10 Ingersoll 72"x8' Travelling Col. Face Millers (1942)

MISCELLANEOUS

18" Dill Slotter
Model H-7 Micromatic Hydro Honer
Model H-2 Micromatic Hydro Honer
Model 200 Micromatic Hydro Honer
S-M Wells Band Saw
Model H-100 Micromatic Hydro Honer
Model 200—H5 Micromatic Horiz. Hone.
No. 2 V 6 O open back press
Baush Radial Tapper (1942)

PLANERS

36"x36"x12' Cincinnati
36"x36"x18' Gray, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

TURRET LATHES

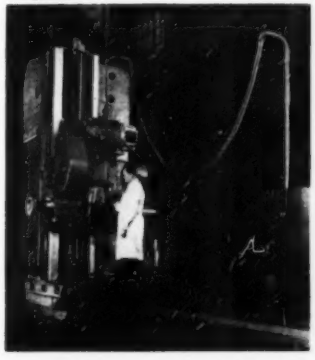
No. 3 Jones & Lamson Bar Feed (1942)
No. 4R Libby, Bar Feed (1942)
No. H-5 Libby
No. 5 Bardons & Olivers (1942)
No. 5 Midland, Bar Feed (1942)
No. 2-A Warner & Swasey
No. 1-H Libby, 6¼ Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3¼" Hole in Spindle
No. 4A Warner & Swasey, 7⅛" Hole in Spindle

VERTICAL BORING MILLS

42" Bullard New Era
42" Colburn
60" Colburn
72" Niles Extra Heavy
84" Betts

FEATURE OF THE MONTH

72" x 8' Ingersoll Travelling Column Face Miller which can handle unusually large milling jobs. Late model. Outstanding condition. Ready for immediate use. See under power in our plant.



ASK FOR OUR COMPLETE LIST

Write, Wire or Phone **HILL-CLARKE MACHINERY COMPANY**
651 WASHINGTON BOULEVARD, CHICAGO 6, ILL. PHONE CEntral 6-0500

HEADLINERS

LATHES

12"x30" MONARCH Model C Tool Room
14"x6' AMERICAN 12-speed Grd Hd, AC MIB, Taper
14"x8' AMERICAN 12-speed Grd. Hd., AC MD, Taper
16"x8' LODGE & SHIPLEY Selec. Grd. Hd., AC MD, taper
17"x8' LeBLOND Hvy. Duty, with AC MD
18"x12' LODGE & SHIPLEY Selec. Grd. Hd., AC MD
20"x8' LODGE & SHIPLEY Selec. Grd. Hd., AC MIB, taper
22"x10' ROCKFORD 3 SCD DBG bowl hd.
24"x12' BOYE & EMMES, AC Turner Uni-Drive
24"x12' AMERICAN Grd. Hd., AC MD, taper
24"x14' LODGE & SHIPLEY, Turner Drive, Taper
30"x12' HOUSTON-STANWOOD-GAMBLE, QC, rais. blocks to swing 43"
30"x16' LODGE & SHIPLEY, Lima Drive, taper

MILLERS

#1—18" CINCINNATI Auto. Plain, backlash elim., 1943
Type "P" OHIO Production Miller, new 1943
#2 CINCINNATI H.P. Rect. O/A Plain, AC MIB, PRT Timken
#2B MILWAUKEE Plain, AC MD, DOA
#2M CINCINNATI Plain, AC MIB, Timken, #50 spindle
#3 KEMPSMITH Univ., self-cont. AC drive, div. hds.
#3B MILWAUKEE DOA Plain, AC MIB, PRT
#4 CINCINNATI H.P. Univ., Lima Drive, div. hd., slot attach.
#4B BROWN & SHARPE Plain, AC MIB, DOA, #50 spindle
#4 CINCINNATI H.P. Rect. O/A Plain, PRT, AC MD
#5 CINCINNATI H.P. Rect. O/A Plain, PRT, AC MD

SHAPERS & PLANERS

14", 24", 28", 32" GOULD & EBERHARDT High Duty
28" AMERICAN H.D., AC MD
32" CINCINNATI Hvy Duty, AC MD
30"x30"x8' CINCINNATI, AC MD
36"x36"x12' NILES-BEMENT-POND, AC MD, 4 hds., box table
36"x36"x16' GRAY, AC MD, 4 hds.

RADIAL DRILLS

4' FOSDICK, AC MD gearbox
4' MORRIS, Enclosed Head, AC MD
6' CINCINNATI-BICKFORD mtr. on arm
7' DRESES, 17" col., AC MD thru gearbox

GRINDERS

#2 BROWN & SHARPE Univ., factory AC MD
#3 ABRASIVE Surface, AC MD
#25A HEALD Rotary Surf., AC MD
10"x24" LANDIS Type C Univ. Hydr., new 1943

BORING MILLS

#3A UNIVERSAL Horz. 3" bar, SPD
#43 LUCAS Horiz., AC MD, 4½" bar, 20' betw. faceplate & outer support
38" KING Vert. Boring Mill, AC MD
42" BULLARD "New Era" V.T.L., AC MD

GEAR MACHINERY

#12H GOULD & EBERHARDT Hobber, AC MD
#18H GOULD & EBERHARDT Hobber, AC MD
#34 BROWN & SHARPE Hobber, AC MD

TURRET LATHES

#4-W CINCINNATI ACME Univ., AC MD, thread chasing
#4 WARNER & SWASEY Univ. Grd. Hd., AC Mtr. in leg
#5 WARNER & SWASEY Univ. Grd. Hd., AC MD
#601 OSTER "Rapiduction," AC MD, bar feed

MISCELLANEOUS

#4 WATERBURY-FARRELL Thread Roller, AC MD
2½" LANDIS Dbl Hd., Bolt Threader, AC MD
10" PRATT & WHITNEY Vert. Shaper
10' x 16 ga. CHICAGO Steel Leaf Brake, AC MD
5½' x 16 ga. VERDIN KAPPES & VERDIN Press Brake, AC MD

YOUR INQUIRIES SOLICITED

COX MACHINERY CO.,
P. O. Box 1953 CINCINNATI 1, OHIO
OFFICE AND WAREHOUSE: 311-313 Bakewell St. Covington, Kentucky
Three minutes from the Cincinnati hotel district.

AVAILABLE FOR IMMEDIATE DELIVERY DUE TO MANUFACTURING CHANGE

2—Thompson Type 4C—12"x16"x48" Hydraulic Surface Grinders, Heavy Duty—30 HP Direct Spindle, Takes 20"x 6"x12" Wheels. One Used 5 Months, One Used 12 Months. *Like New.*

1—New Britain Model 665 Automatic Chucking Machine, Complete with Tooling, Now Set for Size A—V Belt Pulleys. *Is in Perfect Condition.*

1—Sunstrand, Model 33 Rigid Mill Fluid Screw—48" Table Travel for Conventional, or Climb Milling. 10 HP Motor for Spindle, 3 HP Motor for Hydraulic Power. *Perfect Condition.*

1—Sunstrand, No. 1 Hydraulic Rigidmil Type "B" Range of Spindle Speeds from 40 to 2400 RPM. Suitable for Conventional or Climb Milling—3 HP Motor for Spindle, 1 HP Motor for Hydraulic Power, *Like New.*

2—Cincinnati 08 Plain Automatic Milling Machines, Complete with Change Gears and Arbors, Used Only 14 Months. *Perfect Condition.*

Can be seen at our plant under power.

Commercial Grinding & Mfg. Co.
3890 BUCHANAN, S.W.
GRAND RAPIDS, MICHIGAN

BENNETT SPECIALS

36" Bullard Mill, Spiral Dr., 4 Jaw
4" bar Universal Table Type Mill, 60" spin. to table, 96" spin. to outer support, '42.
3" bar Yoder, Table Type Hor. Mill, 30" spin. to tble., 72" spin. to outer support
48"x20' centers N.B.P. Lathe, Grd. Hd.
36"x32" bed Niles Lathe, 2 carr., T.A.
No. 4 Gisholt Univ. Turret Lathe, 1942
2⅝" Acme Gridley RBB, Automatic, 8 spin.
1⅝" Conomatic, 8 spin. (4)
36"x36"x12' Cinci. Hypro Planer, 4 hds., Var. Voltage, 1943
42" & 36" King Side Hd., (2) '43
2½" bar #25T G & L Table, '43
16"/18½"x54" cc Reed Pr., 1942
3' Fosdick 11" col., late, 1943
#65 New Britain Gridley, 8 spin., '43
#36 Van Norman Miller, 1944
ML16 Duall Saw, late
#174 Heald Gap Int. Grinder
#26Y28 Bryant Int. Grinder
4'13" Coll. Bickford Radial, Late
28, 60 Cinci. Hydrotel Mill, 1 spin.
#3 Cinci. Dial Miller, H.S.
#3H K & T Millers (2) Late
#2MH Cinci. Millers (2) Late
#1-18 Cinci. Millers (2) Late
4 Spin. Cinci. 360 deg. Auto Profiler
4" Oster #704 Pipe Threader, M.D.
12"x24" G & L #45 Surface Grinder
#3 and #1A W & S Turret

BENNETT MACHINERY CO.
30 Church St., New York 7, N. Y.

AUTOMATICS

#0G B & S, late type
1½" & 1⅝" B Spdl. Cone, late
9/16", 1", 1⅛", 1⅜", 2", 2¼", 2⅝" Acme Gridleys, #665 & #656, late.
2¼ & 2⅝" Cone 6 Spdl., late
12" and 16" B Spdl. Bullard Multaumatics, late

PRESSES

2800 ton Bliss Hydr., 3 col. type, 12" str., 50½" sht. ht., dia. bed 115"
60 ton Dbl. Crank, 3" stroke, 48x24 bed, late model Waterbury Farrel
90 ton Dbl. Crank, 8" stroke, 48x18 bed, late model Bliss
35 ton 4, 5, 9" stroke, latest type, w/all accessories, Bliss $850.00 ea.
70-85 ton 4" stroke 21 x 27 bed, 110 strokes per min., Bliss, latest type
90-125 ton 4½" or 5" stroke, 60, 80, 110 (optional) strokes per min., late type
Inclinable, New, 20 to 70 ton, immediate delivery
375 ton Elmes, 12" stroke, 84x54 bed, late type
350 ton Elmes, 20" stroke, 38x45 bed, late type
250 & 750 Baldwin, 144x48 bed, 48" stroke
#385 Bliss, 12" stroke, late

TURRET LATHES

#3 & #5 Warner & Swasey, late type, lots of tooling
#4FU Fastermatic, 4" cap., late type
#3HB Libby Sliding Bed Cap. 8¼" cap., late type

MONA MEMBER
PAULS MACHINERY COMPANY
6111 Vermont Ave. — Detroit 8, Mich.
Phone: TYLER 7-6300

STOCK TOOLS — Prompt Shipment

BORING MILL, Hor. #0 G & L, 3" bar
BORING MILL, Vert. 14' Niles 2 Hds., M.D.
BORING MILL, 36" & 42" Bullard, "New Era"
BORING MILL, 72" N-B-P, 2 hds., M.D.
BRAKE, Press, 36 Ft. x ¼", 60" thr., M.D.
CHIP CRUSHER, American, No. SZ-15, M.D.
DRILL, Radial 3' & 5' Cincinnati-Bickford.
GEAR HOBBERS, 12-H Gould & Eberhardt.
GRINDER, Broach "E" Thompson, 6x48" Hyd.
GRINDER, Disc, No. 24-52" Gardner, vert. spdle.
GRINDERS, Surf. Nos. 3 & 5 Abrasives.
GRINDER Surf. Rotary No. 25 Heald.
GRINDER, Snag., Marschke, wheels 24"x3", 10 HP
HAMMER, Pneumatic, Nos. 4-B & 6-B Nazel.
LATHE, 14"x6' Hendey, Grd. Head, T.A.
LATHE, 14"x6' L & S, 12-Speed Grd. Hd.
LATHE, 22"x16' L & S Q.C.G., T.A.
LATHE, 42"x8' c-c, L & S, q.c.g.
LATHE, 24"x12' American, Geared Head
LATHE, 60"-90"x22' American, M.D.
LATHE, Tur., No. 4-A W & S, 8" H.S., M.D.
MILLERS, Pl. No. 4, & 5 Cincinnati.
MILLER, Plain No. 4B K. & T. Vert. Att.
PLANER, O.S., Hyd., 42"x42"x12' Rockford
PRESS, No. 59½ Toledo, Str. 14", Bed 36"x37"
SAW, Friction, No. 3 Ryerson, M.D.
SHAPERS, 16", 20", 24" & 32", M.D.
SHAPER PLANERS, Openside, 26" Farquhar.

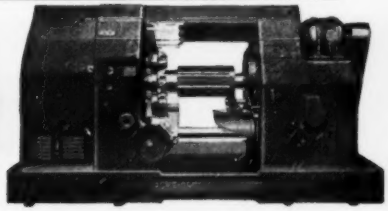
LANG MACHINERY COMPANY
28th St. & A.V.R.R. Pittsburgh, Pa.

SHEET METAL MACHINERY

NEW and USED — HAND and POWER. Apron Brakes, Press Brakes, Shears, Forming Rolls, Power Presses, Pittsburgh Lock Machines, Spinning Lathes, Spot Welders, etc.

MONA MEMBER
B. D. BROOKS, INC.
381 Atlantic Ave., Boston 10, Mass

MODERN
used and rebuilt
MACHINE TOOLS



Model RPA-8 6" Acme Gridley Automatic Chucking Machine. Latest Model.

AUTOMATICS
6" RPA-8 Acme Gridley Chucker. Late.
6" Goss & DeLeeuw Chucker, 8 spdl. 1943.
9/16" RA-6 Gridley. 1942.
9/16" RA-6 Acme Gridley Chucker. 1942.
1⅝" Greenlee. 1942.
No. 60 New Britain, 6 spindle. 1942.
No. 1½B Cleveland. Late.
Model 3-8 Ceco. Late.

BORING MACHINES
3" Yoder Boring Mill. 1942.
No. 49 Heald "Bore-Matic" Double end. 1942.
No. 49 Heald "Bore-Matic" Single end. 1942.
No. 46B Heald "Bore-Matic". 1940.
No. 47A Heald "Bore-Matic". 1942.
No. 2112A Excello. 1943.

BROACHES
No. SRV 40-66 Lapointe Vertical Surface. 1942.
No. CPC 6-30 Lapointe Vertical. 1941.
48" Oilgear Horizontal.
6 Ton American Vertical. Late.

DRILLS, HEAVY DUTY
25" Fosdick Economax. 1941.
24" Sibley Sliding Head. 1942.
No. 3 Bausch Multiple Spindle.
Fox Multiple Spindle. 1944.
Barnes 2 Spindle Deep Hole. 1943.
No. ½ B P & W Deep Hole. Late.
No. ½ B P & W Reamer. Late.
No. ½ B P & W Hyd. Rifler. Late.

DRILLS, RADIAL
6' 17" Carlton. 1942.
Bausch Drill & Tapper. Late.
20" Pfiffner Drillmaster. 1942.

DRILLS, SENSITIVE
20" Walker Turner 6 Spindle. 1942.
No. KH2 Allen, 6 Spindle. 1943.
16" Atlas, 4 Spindle. 1942.
15" Atlas, 4 Spindle. 1942.
14" Delta, 4 Spindle. 1942.
No. 2 Motor Avey, 4 Spindle. 1943.
No. 2 MS Allen, 1 to 3 Spindle. 1942.
No. 2 Motor Avey, 3 Spindle. 1942.
No. 2B-8 Edlund, single spindle. 1942.
No. 2 Hamilton-Muehlmat. 1943.
Leland-Gifford, Single Spindle. 1942.

GEAR EQUIPMENT
3" Gleason Bevel Gear Gen. 1942.
No. 715 Fellows Gear Shaper. Late.
No. LS Fellows Gear Lapper. Late.
No. 6 Gleason Tester. Late.
No. 12 Gleason Tool Sharpener. 1942.
Model GCL-3 Red Ring Gear Shaver. 1942.
No. 860B Michigan Gear Shaver. Late.
15" Red Ring Gear Lapper. 1942.
Red Ring Universal Gear Checker. Late.
10" Red Ring Gear Speeder. Late.
Type S Barber-Colman Hobber. 1942.
No. 140 Cleveland Hobber. 1942.
Vinco Spline & Gear Grinder. 1942.
No. 7125A Fellows Gear Shaper. 1943.

GRINDERS, CYLINDRICAL
16"x36" Cincinnati Plain. 1942.
14"x36" Norton Type C Universal. 1943.
12"x48" Cincinnati Universal. 1943.
10"x72" Landis Type C Plain. 1942.
10"x24" Landis Type C Universal. 1942.
10"x18" Norton Type C Plain. 1942.
6"x30" Cincinnati Plain. 1943.
6"x24" Norton Plain. 1936.
6"x18" Landis Type C Plain. 1941.
6"x18" Norton Type C. 1942.
4"x12" Landis Type H Plain. 1942.
No. 5 Brown & Sharpe Plain. Late.
No. 2 & 3 Cincinnati Centerless. 1942.

GRINDERS, INTERNAL
No. 81 Heald "Sizematic". Late.
No. 74 Heald Extended Bridge. 1941.
No. 75A Heald, two motor. 1943.
No. 72A3 Heald Plain. 1942.
No. 72A5 Heald Plain. 1944.
No. 16A22 Bryant Internal. Late.
No. 5 Bryant Internal. Late.
No. 104 Rivett. 1942.

GRINDERS SURFACE
16"x16"x48" Thompson, Type C. 1943.
14"x36" Pratt & Whitney Vertical. Late.
6"x18" Robot. 1942.
72" Rogers Knife Grinder. Late.
No. 2B Reid. 1944.
No. 25A Heald Rotary. 1942.
No. 22 Heald Rotary. 1943.
6" Taft Pierce Rotary. Late.
A-18 Arter Rotary. 1942.

GRINDERS, TOOL & CUTTER
No. 2 LeBlond. Late.
No. 13 Brown & Sharpe. Univ.
No. 91A Covel Universal. 1942.
No. 22 Covel Universal. 1942.
No. 4T Sellers Carbide Tool. 1942.
Barber-Colman Combination. 1943.
No. 44 & 48 Excello. 1942.
Milwaukee Face Mill. 1942.
No. P5 Bura Way Carbide Tool. 1942.

LATHES, ENGINE
18"x54" Lodge & Shipley. 1943.
18"x48" Bradford. 1942.
14"x30" American "Pacemaker". 1944.
16"x28' South Bend c.d. 1944.
14"x54" Reed Prentice. 1942.
14"x30" Lodge & Shipley. 1943.
14"x6' Hendey.

LATHES, PRODUCTION
20"x25" Fay Automatic. 1942.
Model 10 Sundstrand. 1942.
Model 8 Sundstrand. 1942.
14"x42" Monarch "Magna-Matic". 1941.
12"x18" Lipe "Carbo". Latest.
9"x20" Lipe. 1942.
8"x36" Lo-Swing Semi-Auto. 1942.
8"x21" Fay Automatic. 1942.
Model IMP & R Lo-Swing. 1942.

LATHES, TURRET
No. 9A Jones & Lamson. 1942.
No. 3L Gisholt. Late.
No. 2L Gisholt. 1942.
No. 1A Warner & Swasey. 1944.
No. 1 Acme Universal. 1941.
8½"x24" Acme. 1943.
No. 2A Warner & Swasey.
No. 5 Warner & Swasey. 1941.
No. 4 Warner & Swasey. 1941.
No. 3 Warner & Swasey. 1943.
No. 2 Warner & Swasey. 1941.
No. 2, 5 & 7 Bardons & Oliver. 1941.
No. 3 & 4 Gisholt. 1943.
No. 4 Midland. Late.

MILLING MACHINES, PLAIN
No. 3B Brown & Sharpe. 1941.
No. 2B Brown & Sharpe.
No. 2 Cincinnati Dial Type. 1942.
No. 2M Cincinnati.
No. 2H Milwaukee. Late.
No. 2HL Milwaukee. 1942.
No. 3 Van Norman. 1942.
Van Norman Hand Mill. 1942.

MILLING MACHINES, PRODUCTION
No. BL2420 P & W "Keller", 3 spindle. 1942.
No. BL2416 P & W "Keller", single spindle. 1943.
No. BG "Keller" single spindle.
No. 4-48 Cincinnati Plain. 1942.
No. 1248 Milwaukee "Simplex". 1942.
No. 2-18 Cincinnati, Rise & Fall. 1942.
No. 1-18 Cincinnati. 1942.
No. 08 Cincinnati, Rise & Fall. 1942.
No. 08 Cincinnati Plain. 1942.
No. 12 Brown & Sharpe. 1942.
No. 1-8 Kent Owens. 1942.
No. 1-14 Kent Owens. 1943.
No. 2-20 Kent Owens. 1942.
No. MM-1-5-2 U.S. Multi-Miller. 1943.
No. MM-1-6 U.S. Multi-Miller. 1942.
No. 0 & 2 Sundstrand. 1943.

MILLING MACHINES, THREAD
6"x60" Pratt & Whitney, Late.
12"x54" Lees Bradner. Late.
8"x16" Hanson-Whitney. Late.
4½"x12" Pratt & Whitney. Late.
4"x9" Hanson-Whitney. Late.

MILLING MACHINES, UNIVERSAL
No. 2 SU Van Norman. 1942.
No. 2H Milwaukee. 1942.
No. 2 MH Cincinnati Univ. 1942.

MILLING MACHINES, VERTICAL
No. 2 Milwaukee, Model D. 1945.
No. 3K Milwaukee. 1942.
No. 3H Milwaukee. 1940.
No. 2K Milwaukee. 1942.
No. 3 Cincinnati. 1942.
No. 2 Cincinnati. 1940.
No. 2 Milwaukee.
No. 1 Cleveland. 1942.

MISCELLANEOUS
6"x¼" Bertsch Bending Roll. Late.
10'x14 Ga. Chicago Press Brake. Late.
No. 333 Chicago Press Brake. Late.
No. 405 Williams Turnings Crusher. 1943.
200 Lb. Bradley Helve Hammer. 1941.
No. 7B High Speed Riveting Hammer. 1942.
J & L Comparator. Late.
50KVA Federal Spot Welder. 1942.
Model MA Sunnen Hone. 1942.
No. 616 Cleveland Rigidturner.
No. 26 F Norton "Hyprolap". 1942.
No. 74 Excello Center Lapping Mach. 1942.
3' Leland Gifford Radial Tapper. 1941.
No. 1 Savage Roller Type Nibbler. New.

PLANERS & SHAPERS
52"x36"x40' Cincinnati Planer.
36"x36"x16' Ohio Planer.
16" Gould & Eberhardt Shaper.
12" New Haven Vertical Slotter. Late
6" Pratt & Whitney Vertical Shaper.

PRESSES
100 Ton Hannefin Hydraulic. 1942.
50 Ton Denison Hydraulic. Late.
45 Ton Reliance. 1942.
No. 8-6 Zeh & Hahnemann. 1942.

SAWS
14"x20" Racine "Shear Cut". 1942.
13"x13" Peerless Universal. 1943.

ALL MACHINES MAY BE INSPECTED UNDER POWER IN OUR WAREHOUSES

Indianapolis
MACHINERY & SUPPLY CO., INC.
1961 South Meridian Street, Indianapolis 6, Indiana
Telephone: GArfield 4421

HIGH QUALITY NEW, USED AND REBUILT MACHINE TOOLS

EXPORT OFFICE:
44 Whitehall Street, New York City

MEXICAN OFFICE AND WAREHOUSE:
Hidalgo Oriente 2-535-B, Mexico, D. F.

GET "LIKE NEW" PERFORMANCE WITH CIMCO REBUILT TOOLS

AUTOMATICS
Conomatic 1¼", 8 spindle
Cleveland, Model AA-08

BORING MILLS
Cleveland #1, 2½" bar, MD (Horiz.)
Lucas #41, 4½" bar, MD (Horiz.)
Bullard New Era, 24", Side Head, MD
King 34", one rail head, MD
Bullard New Era 36", Side head MD
Niles 36-44 Vert. Turret Side head MD
Bullard Maxi Mill 54", two rail heads, MD
Defiance #6 Horiz. 4½", MD

LATHES—ENGINE & PRODUCTION
American 14"x6'—14"x8', 3 SCD, BG, Bowl Head
American 16"x6'—16"x8', 3 SCD, D.B.G.
American 16"x6'—16"x8' GH, MD
American 18"x6'—18"x8'—18"x10' GH, MD
American 18"x8'—18"x10' 3 SCD, DBG, Bowl Hd.
Boye & Emmes 18"x6' SCEL
Boye & Emmes 18"x8' SCEL
Boye & Emmes 20"x10' SCEL

LATE TYPE
Boye & Emmes 16"'x54" GH & QCG

Boye & Emmes 24"x16' HD, GH
Boye & Emmes 26"x16' QCG, MD
Boye & Emmes 40"x30' GH
Hendy 14"x6' Model EBM, Tool Room, MD
Hendy 14"x6' 4 SCD, Yoke head
Hendey 18"x8' 4 SCD, Yoke Head, Tool Room
LeBlond 14"x6'—14"x8' 4 SCD, BG
LeBlond 14"x6' GH, MD, BG
LeBlond 17"x6'—17"x8' GH, MD
LeBlond 17"x8' 3 SCD, Hi Duty, DBG
LeBlond 21"x8'—21"x10' HD, 3 SCD, DBG
Monarch 14"x6' 3 SCD, DBG
Monarch 16"x6'—16"x8' GH, MD
Monarch 18"x10' Model BBiG Speed GH, MD
Monarch 20"x10' Model BBiG Speed, GH, MD
Reed Prentice 16"x8' GH, MD
Sebastian 16"x8' 4 SCD
Lodge & Shipley 16"x6'—16"x8' Selective GH, MD
Lodge & Shipley 18"x8'—18"x10' Selective GH, MD
Lodge & Shipley 18"x54" centers GH, Latest Type
Lodge & Shipley 18"x8'—18"x10' 3 SCD, DBG
Sebastian 20"x8' GH, MD Very Late Type
American 24"x12', 2 speed GH, SCEL
American 24"x12', 8 speed GH, SCEL
American 24"x16', GH, SCEL, MD
American 30"x15', SCEL, MD
Ohio 20" Back Geared 4 SCD
American 30"x26' GH, SCEL, MD
Lodge & Shipley 24"x14', SCEL, 3 SCD, DBG
LeBlond 25"x12' HD, QC, SPD, SCEL
LeBlond 25"x16', HD, 3 SCD, SCEL
Niles Timesaver 30"x10' (First Class Cond.)
Lodge & Shipley 36"x26', Patent Head, SCEL

GEAR CUTTERS
Gleason 3" Bevel Gear Generator, SPD
Gleason 6" Bevel Gear Generator SPD
Gleason 15" Spiral Bevel Gear Generator
Barber Coleman Model S for Precision Gears
Fellows #615 Helical Spur Gears MD
Fellows #6 Cuts internal & external
Pfauter #R2 Hobber, 40" Cap.
Gould & Eberhardt 36" S Automatic Gear Cutter
Gould & Eberhardt 18 H Gear Hobber, MD
Brown & Sharpe 20", 36", 48" and 60", SPD
Cross, #1 Gear Tooth Rounder

GRINDERS—ALL TYPES
Landis 4"x12" Type H, Plain Cyl.
Landis 10"x24" Type C Hyd. Univ., Latest
Landis 12"x72" Plain Cyl., MD
Landis 16"x72" Plain Cyl. Self Contained, MD
Landis 20"x220" Plain Cyl. Self Contained, MD
Landis Chaser Grinder, Model Y MD
Norton 10"x24" Type GA Plain Cyl. MD
Cincinnati 12"x48" Plain Cyl., MD
Brown & Sharpe #2 Univ., Belt Drive
Heald 72A1 Internal, Complete, MD
Ex-Cell-O 31L Precision Thread MD
Rivett 104-2, Internal MD
Cincinnati No. 3 Centerless
Gardner #120 A SI Opposed Wheel Grinder Latest type
Gardner #124-53 Horiz. Disc Grinder MD
Pratt & Whitney 10" Spiral Gear, 2 Wheel type
Thompson 6"x18", 6"x24" Type F Hyd. Surface
Norton 6"x18" Surface Grinder, MD
Arter Model A 3 12 Surface Grinder, MD
Heald 25A Rotary Surface Hyd. 16" Chuck, 1943
Gallmeyer & Livingston, 14"x18"x72" Model A Hyd.
Bridgeport #95—86" Face Grinder

LATHES—TURRET
Gisholt #3 Univ. Ram Type, New 1943
Gisholt, #3L, Saddle Type, Hardened Way, MD
Warner & Swasey #2A Hollow Hex
Warner & Swasey, #3 Univ. Late type
Warner & Swasey #3A Univ. Timken Bearing, MD
Jones & Lamson 3½"x32" Flat Turret, MD
Gisholt, #2L, Univ. New 1943

SHAPERS & SLOTTERS
Smith Mills 15" single pulley drive GB
Gould & Eberhardt 16", 20", 24" V ram, Cone Drive GB
Gould & Eberhardt 18" Univ. MD
Cincinnati 18", 24" Back Geared, Cone Drive

GUARANTEED MACHINERY

Cincinnati Machinery Co., Inc.
219 East Second Street
Cincinnati 2, Ohio

LATE MODEL MACHINE TOOLS

30"x38' LEHMANN "Hydrotol" Geared Head Lathe.

50"x17' centers LeBLOND "Big Swing" Geared Head Lathe.

No. 174 HEALD Gap Grinder.

No. 16-28 BRYANT Gap Grinder.

3" bar UNIVERSAL Hor. Boring Mill.

3'11" AMERICAN & MORRIS Radial Drills.

Wigglesworth Machinery Co.
197 Bent St. Cambridge, Mass.

FOR SALE BY OWNER

Machines now operating
Inspection invited

Model 8D Sundstrand Stub Lathe, 1945
No. 1 Sundstrand Rigidmil, 1943
No. 5 B&S Cylindrical Grinder, 1943
20 Single & Double Spindle Delta 17" Drills with Bellows Feeds, 1946
No. 3 Barber-Colman Hobbing Machine, 1945
No. 10U Norton Lapping Machine, 1945
No. 201-¼ Barnes Drill, 1944
No. 48A Hea'd Baremastic Single Spindle with Hydraulic Table Shift, 1946
No. 6T24 American Broach, 1944
Model 861 Michigan Tool Gear Shaver, 1946
No. 1F Blanchard Grinder—36" Chuck, 1942

HILL MACHINE COMPANY
P. O. Box 677 Rockford, Ill.

FOR IMMEDIATE DELIVERY

18" x 72" LANDIS Type "C" Hydraulic UNIVERSAL CYLINDRICAL GRINDER

Built new in 1944.
AC-MD; fully equipped including EXCELLO Internal Attachment.

Write, Wire or 'Phone

ALEX ZEEVE & COMPANY
2617 Woolworth Building New York 7, N. Y.
'Phones:
COrtlandt 7-8250 BEekman 3-1246

GUARANTEED TOOLS

16"x54" LE BLOND Toolroom Lathe, 1943
20"x10' AMERICAN High Duty 12 Speed Timken Head, taper attachment, M.D.
24"x16' LODGE & SHIPLEY, 12 Speed Geared Head Engine Lathe, taper attachment
24"—36" and 42" BULLARD V.T.L.
48"x28' DRIGGS (NEW HAVEN) Geared Head Lathe
No. 3 BARDONS & OLIVER Turret Lathe
No. 4 GISHOLT Turret Lathe, bar feed
62" KING, 2 swivel heads, P.R.T.—A.C.—M.D.
No. 1224 KEARNEY & TRECKER Simplex
42"x42"x12" INGERSOLL Adjustable Rail Planer Type Mill, 4 heads, 25 HP motor
32" OHIO Heavy Duty Shaper, 1942
Type BGI-482 KELLER Automatic Toolroom Duplicating Machine, 3 dimensional, 1944
6' CINCINNATI GILBERT Radial, 15" column, motor on arm
No. 5 NEWARK Universal Gear Hobber, 72" cap.

O'CONNELL MACHINERY CO.
1825 NIAGARA ST BUFFALO 2 N.Y.

STOCK MACHINERY

AUTOMATIC—2-⅝" N.B. 4 Sp. 1940

BOREMATIC—#47 A. Heald 3 Hds. 1942

DRILLS—Delta 4 Sp. 17" 1946

MILLS—#3 Cin. Mod. Speed Dial 1942: 45-60 Cin. Hyd. 1933: 35-60 Cin. Duplex Hyd. 1933: #1-12 Cin. Automatic 1942: Thread 20 MD Smalley General: Taylor Fenn Spline Duplex 4" Late: #3 K & T Vert. Rot. Table Built in.

TAPPERS: #2-½ Allen #3 MT 15" Throat #1 D.B. Cleveland 1-½" 1944

GRINDERS—Landis 14x72 Ser. 15806: Norton 10x36 Angle 45 Cyl. 1943 Cin. 10x18 Plain Cyl. 1941: Landis 4x12 Mod. 4H 1942: Excello #33 Thread 6x18—1944: Heald 72-A-5 Internal 1941: B & S #2 Univ. 1938: Pratt & Whitney 9" Spur Gear ser. 132: Pratt & Whitney 10" Spur & Helical: Ingersoll Cutter 30" ser. 15121

MAGNA FLUX—Model ANQ 484.5 AC 1943

CHIP WRINGER—40" Tollhurst 1945

DUST COLLECTOR—6D, 10D Roto-clone: M.G. Set 100 KVA 2300 V 3ph to 230 V, DC Older

INDUSTRIAL SERVICE, INC.
Elk at E. 105th St., Cleveland, Ohio

Bor. Mill, Hor. 3" G & L, MD. 4½" N-B-P—MD.
Boring Mills, 24"-30"-42"-52"
Drills, Radial 3'-4'-5'-6' Cin.-Bick.
Lathe, Turret 3-A W and S, S.P.D.
Millers, Plain No. 3 K and T, No. 4 Cin.
Millers, Vertical No. 3 B and S and No. 4 Cin.
Shaper, 16"-20"-24"-36".
Shaper, 36" Morton Draw Cut.
Squaring Shear, Niagara 11'x10 gauge

West Penn Machinery Company
1210 House Bldg. Pittsburgh, Pa.

POWER PRESSES

BLISS, TOLEDO, V & O, ETC.
REBUILT — GUARANTEED
MONA

JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

PRACTICALLY NEW

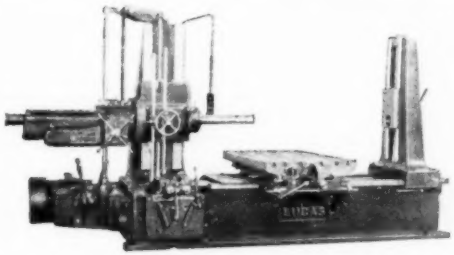
TOLHURST CENTRIFUGAL 40" CHIP WRINGER, SERIAL #T-8643-A, BASKET RPM—700. Complete with 7½ HP, 3/60/220/440 Motor. PRICE $1,000.00

WINSTON MACHINERY CO., INC.
517 South Delaware St., Indianapolis 4, Ind.

SIMMONS ENGINEERED Machine Tool REBUILDING NEWS

SIMMONS MACHINE TOOL CORPORATION • MAIN OFFICE AND PLANT, 1759 N. BROADWAY, ALBANY, N. Y.

HORIZONTAL BORING MILLS WITH LOTS OF *UNUSED* WORKING HOURS



No. 42—4" Spindle Lucas Horizontal Boring, Milling and Drilling Machine. Power rapid traverse. AC or DC motor. Table working surface 30" x 60". Spindle nose to outer support maximum 72". Spindle speeds 18. Feeds 18.

- 2½" spindle Cleveland, table 20" x 42"
- 3" spindle No. 31 Lucas, table 24" x 48"
- 4" spindle Lucas, table 30" x 48"
- 4½" spindle Defiance, table 36" x 64"
- 4½" spindle Niles duplex, table 33" x 60"
- 5" spindle Niles "Timesaver" table 60" x 96"
- 6" spindle Jones Planer, table 7'6" x 17' and auxiliary 3½" high speed spindle, milling range 8'7" x 12'
- 8" spindle Niles Floor Type, range 12' x 12'
- 10" spindle Sellers Floor Type, range 9'8"x18'
- 6" spindle Simmons Cylinder Boring
- 8" spindle Barrett Cylinder Boring

Write today for complete current list of Simmons *Engineered-Rebuilt* Machine Tools.

NEW YORK CITY OFFICE: 50 EAST 42nd STREET

LATE TYPE MACHINE TOOLS

ADOLPH I. BUEHLER CO., Wet Disc Gdr.
CHANDESSON 2,000 amps Plating Gen. Set
CHICAGO PNEU. Spring Hoist 110 lbs. capacity
ERCO Model #1002 Riveter
EXCELLO #112 Boring Machine
FELLOWS #72 Gear Shaper
GENERAL ELECTRIC Atomic Hydrogen Arc Welder model 6WK 20A1
GENERAL ELECT. One Million Volts X-ray Mach.
GENERAL FLEXIBLE Press
GIBBS #375 Swiss type ⅜" Screw Mach.
GLEASON #1 & #6 Gear Testers
GLEASON 15" & 25" Quenching Presses
HANSON VAN WINK, 1,000 amps Anodizing Set
ILLINOIS #224 Involute Gear Checker
LANDIS 10x24" Univ. Hyd. Ext. Cyl. Gdr.
LANDIS 4H Plain Grinder
LEEDS NORTHRUP Homocarb Furnace 25x36"
LINDBERG Heat Treating Furn., Elec. 282SEH and 16206H
NATIONAL BROACH 18" Gear Shaver
NORTON 6x18" Ext. Cyl. Grinder
OLIVER #510 Drill Pointer Grinder
ONSRUD Routers, model W240 and W255
RANSOME Welding Positioner, head and tailstock type, 6,000 lbs. capacity
RANSOME Welding Positioner, 6,000 lbs. capacity variable speed drive
RANSOME Welding Positioner, 16,000 lbs. cap. constant speed drive.

ANDOVER 3-3972

WALTER H. MEYER
Machinery and Equipment Co.
605 W. Washington Blvd., Chicago 6, Ill.

Metal Forming and Bending Machine
#206-F Toledo 155 Ton D.C. Press, 3" Stroke, 20" x 110" Bed Area
½" x 144" Dreis & Krump Squaring Shear
Roller Type Slab Miller 22" Slab capacity
12 Spindle Moline Automatic Drilling Machine
3 spindle Moline Model 7-D Cylinder Borer
1 -A W&S Universal Turret Lathe
38" x 14' Schumacher & Boye Engine Lathe
Libby 26" x 4½" spindle Turret Lathe
#33 ExCello Thread Grinder
Lees Bradner CT 36" Thread Millers
10" x 48" Roll Grinder
300' Air Compressor, Ingersoll Rand, 50 HP Motor Drive.

CONTINENTAL SALVAGE
& MACHINERY CORPORATION
1836 EUCLID AVENUE, CLEVELAND 15, OHIO
MAIN 4402

LATEST TYPE MACHINE TOOLS

LATHES

LODGE & SHIPLEY 14"x30" Selective Head
SEBASTIAN 16"x8' Geared Head (2)
SOUTH BEND 14½"x6'—T.A.
SOUTH BEND 16"x12'—T.A.
LEBLOND 13" Rapid Production
FAY & SCOTT 20" 40" Gap—M.D.

TURRET LATHES

B&S #2 Wire Feed
GISHOLT #5 Univ.—Air Chuck
GISHOLT #3R Saddle Type—bar & chucking
W&S #1A Saddle Type—pres. head
W&S #2A Saddle Type—pres. head
W&S #3A Saddle Type—cross sliding turret T.A.
W&S #3 Univ.—Air Chuck
W&S #4 Univ.—Bar

MILLING MACHINES

B&S #2A Univ.
B&S #2 Light Type Univ.
B&S #3B—Plain—S.P.D.—Vert. Attach.
CINCINNATI #2 Dial Type—HiSpeed Vert.
K&T #2HL Plain
K&T #2K Plain
K&T #3B Plain—M.D.
K&T #3H Plain
K&T #2K Vert.
K&T #3H Vert.
"NICHOLS"—Hand (4)
VAN NOMAN #2S Plain
LEES-BRADNER #40 Thread

GRINDERS

ARTER #A3—12" Surface
BLANCHARD #11—20" Surface
ROBOT 6"x18" Surface
B&S #1 Universal
CINCINNATI #2 Centerless
GRENBY 1G-12 Internal
LANDIS 10"x24" Universal
LANDIS #4H 4"x12" Cyl.
NORTON 6"x18" Type C Cyl.
NORTON 12"x36" Mult. Purpose
NORTON #2 Cutter & Tool
SELLERS MODEL #6T Wet Tool

DRILLS

ALLEN #2 Motor Spindle—2 sp.
CANEDY-OTTO 21" Box Col. Upright (2)
LELAND GIFFORD 1LMS Sing. Sp.
LELAND-GIFFORD 1LMS—6 Spindle
LELAND GIFFORD 2LMS—Sing. Sp.—Pw. Fd.
LELAND GIFFORD 2MS—spindle—Pw. Fd.

MISCELLANEOUS

PRATT & WHITNEY #12B — 2 spindle Profilers
ROCHESTER 3" Bar Hor. Boring Mill
FOSTER Superfinisher
BLISS #4 Stiles Type Press—45 ton (4)

Many Tools Not Listed — Send Us Your Inquiries

UNITED MACHINERY & TOOL CORP.
85 CENTRAL STREET **WORCESTER, MASS.**

FOR SALE
INDUSTRIAL CHILLING MACHINE
DEEP FREEZE CASCADE—120° F. Height 38", Length 87", Width 32¼", Approximately 7½ cubic feet. WITH 2 MOTORS, ½ and ⅝ HP, 3/60/220.
PRICE $850.00

WINSTON MACHINERY CO., INC.
517 South Delaware St., Indianapolis 4, Ind.

2—Lodge & Shipley Duomatic lathes
2—Potter & Johnston #5 DE Chucking machines
1—D. E. Whiton #18 gear cutter
1—Monarch Lathe, 22 x 48"
1—3 spindle Gould & Eberhardt spur gear and bevel rougher
1—Heald double spindle Borematic

SIER-BATH GEAR & PUMP CO., INC.
9252 Hudson Boulevard, North Bergen, N. J.

INDEX OF PRODUCTS ADVERTISED IN THIS ISSUE

Abrasives.....18-19, 36-37, 146, 223, 250
Bearings.....4th Cover, 68, 180
Books, Technical..... 228
Boring, Drilling & Milling Machines (Horizontal).....2nd Cover, 64, 236
Boring & Turning Machines (Vertical) 77
Broaching Machines.....155, 169
Brushes 165
Castings.....196, 219, 244
Centrifugal Machines..... 200
Chucks.....51, 55, 203, 216, 226, 236, 258
Cleaning & Drying Machines & Supplies 232
Counters 20
Coolant Systems, Filters & Supplies.. 188, 193, 198
Cut-Off Machines; Sawing Machines.. 215, 220, 242, 248, 260
Die Making Machines..... 216
Drafting Room & Equipment & Supplies 142
Dressers, Grinding Wheel..... 234
Drilling Machines..56, 72, 83, 88, 144, 157, 191, 195, 197, 200, 201, 212, 235, 238, 245
Duplicators & Pantographs..22-23, 159, 211
Electrical Parts & Equipment.....53, 82, 199, 229, 251
Engineering & Production Services... 212
Fabricating Methods & Services..... 217
Fasteners.....58, 62, 153, 179, 185, 232
Finishing Machines..... 69
Forgings 216
Gages & Instruments.....60, 139, 140, 178, 181, 208, 210, 220, 230, 238, 244
Gear Cutting Machines.....3, 6-7, 194, 258
Gears, Speed Reducers, Motor Reducers.....67, 82, 84, 186, 190, 255, 256, 257, 258, 259
Gear Testers..... 3
Grinders—Cutter & Tool.....211, 241
Grinding Machines—Production.....5, 12-13, 18-19, 50, 76, 191, 213, 242, 250
Heads: Drilling, Grinding & .. Tapping 212, 246
Heat Treating Equipment & Supplies.....3, 182, 228
Honing Machines..... 172
Hydraulic & Pneumatic Parts & Equipment 209, 227
Jig Borers..... 59
Lathes, Automatic....25, 42-43, 45, 52, 211
Lathes, Engine.....21, 22-23, 32, 48, 61, 159, 171, 216
Lathes, Turret.....25, 35
Lubricants, Cutting Fluids, Quenching Oils, Rust Preventives.....73, 74, 194, 204, 227, 230, 233, 243, 258
Lubricating Systems & Equipment 193, 214
Marking Machines & Tools..... 234
Materials, Cutting & Forming..... 190
Materials of Manufacture.....14-15, 30-31, 54, 75, 161, 168, 170, 180, 206, 234
Materials Handling Equipment.....26-27, 189, 225
Mechanical Parts & Equipment.68, 207, 250
Millers, Die Sinkers, Profilers.....4, 8-9, 38-39, 219, 239, 246
Power Transmission.....16-17, 53, 81, 82
Presses, Forging & Forming Equipment & Supplies.....28-29, 40-41, 47, 70-71, 78, 79, 177, 202, 205, 212, 216, 221, 228, 230, 238, 240, 246, 247, 258
Production, Inventory & Tool Control. 175
Riveting Machines.....208, 234
Safety Equipment.....174, 184, 222
Screw Machines; Chucking Machines 3rd Cover, 46, 80, 220
Shapers, Slotters, Keyseaters...90, 232, 250
Special Machine Tools..... 236
Swaging Machines..... 242
Tapping Attachments..... 212
Tapping Machines..... 212
Threading Machines.....10-11, 173
Tooling Set-Up Equipment.....66, 241
Tools, Cutting.....24, 33, 34, 44, 49, 57, 63, 65, 80, 167, 173, 176, 183, 184, 212, 220, 224, 231, 254, 260
Tools, Hand.....176, 218, 242
Tools, Portable.....232, 242
Vibration Control..... 192
Welding & Cutting, Brazing & Soldering Equipment & Supplies.....163, 237, 242

ADVERTISERS INDEX

	Page
Abbott Ball Co.	250
Abrasive Machine Tool Co.	250
Acheson Colloids Corp.	243
Air Reduction	237
Allen Manufacturing Co.	179
Allied Products Corp.	246
Allis-Chalmers Manufacturing Co.	53, 82
Almond Mfg. Co., T. R.	258
Alox Corp.	194
American Air Filter Co.	174
American Magnesium Corp.	54
American Optical Co.	181, 222
American Screw Co.	153
American Steel Foundries King Machine Div.	77
American Swiss File & Tool Co.	176
American Tool Works Co.	21
Ames Co., B. C.	178
Amgears, Inc.	190
Anton Machine Works	230
Apex Machine & Tool Co.	218
Armstrong-Blum Manufacturing Co.	14
Armstrong Brothers Tool Co.	66
Atlantic Steel Co.	216
Automatic Transportation Co.	225
Automotive Gear Works, Inc.	67
Axelson Manufacturing Co.	171
Baker Bros. Inc.	144
Baldwin Southwark Div. Baldwin Locomotive Works	28-29
Barber Colman Co.	57
Barnes Drill Co.	197
Barrett Co., Leon J.	208
Bath & Co., John	231
Baumbach Manufacturing Co., E. A.	258
Baush Machine Tool Co.	195
Beatty Machine & Mfg. Co.	177
Bijur Lubricating Corp.	214
Bilgram Gear & Machine Works	256
Blanchard Machine Co.	50
Bliss Co., E. W.	10-11
Bridgeport Brass Co.	206
Bridgeport Machines Inc.	72
Brown & Sharpe Mfg. Co.	51, 63
Bryant Machinery & Engineering Co.	61
Buffalo Forge Co.	215
Bullard Co.	13
Carlton Machine Tool Co.	238
Carnegie-Illinois Steel Corp.	75
Carpenter Steel Co.	30-31
Chambersburg Engineering Co.	205
Chandler Tool Co.	246
Cincinnati Bickford Tool Co.	83
Cincinnati Electrical Tool Co.	242
Cincinnati Gear Co.	256
Cincinnati Gilbert Machine Tool Co.	201
Cincinnati Grinders Incorporated	5
Cincinnati Lathe & Tool Co.	48
Cincinnati Milling Machine Co.	4
Cincinnati Shaper Co.	90
Cleveland Punch & Shear Works Co.	202
Cleveland Twist Drill Co.	49
Colonial Broach Co.	155
Columbia Steel Co.	75
Columbus Die Tool and Machine Co.	236
Cone Automatic Machine Co.	46
Consolidated Machine Tool Corp. Modern Tool Works Div.	55
Continental Screw Co.	185
Covel Manufacturing Co.	191
Cross Co.	194
Cushman Chuck Co.	203
Danly Machine Specialties Inc.	79
Davis & Thompson Co.	236
Davis Keyseater Co.	232
Dayton Rogers Mfg. Co.	212
Delta Manufacturing Co.	241
Dempster Brothers Inc.	26-27
Diamond Machine Tool Co.	228
Dodge Mfg. Corp.	68
Dumore Co.	252
Earle Gear & Machine Co.	256
Eastern Machine Screw Corp.	220
Electric Auto-Lite Co.	219
Etna Machine Co.	242
Ex-cell-o	200
Farrel-Birmingham Co., Inc.	257
Federal Electric Products Co.	229
Federal Products Corp.	210
Fellows Gear Shaper Co.	6-7
Felters Co.	192
Fenn Manufacturing Co.	242
Fosdick Machine Tool Co.	56
Gairing Tool Co.	224
Gallmeyer & Livingston Co.	76
Ganschow Gear Co.	256
Geometric Tool Co.	34
Gisholt Machine Co.	52, 69
Gleason Works	3
Gorton Machine Co., George	211
Goss & deLeeuw Machine Co.	220
Grant Mfg. & Machine Co.	234
Gray Co., G. A.	64
Greaves Machine Tool Co.	246
Greenfield Tap & Die Corp.	33
Gulf Oil Corp.	233
Hanchett Magna Lock Corp.	236
Harrison Radiator Div. General Motors Corp.	198
Hartford Special Machinery Co.	258
Heald Machine Co.	2nd Cover
Hones, Inc., Charles A.	228
Houghton & Co., E. F.	227
Hoyland Steel Co.	190
Industrial Carbide Tool Co.	183
James Mfg. Co., D. O.	258
Johnson Bronze Co.	180
Johnson Gas Appliance	182
Jones & Lamson Machine Co.	45
Kearney & Trecker Corp.	38-39
Kennametals Inc.	254
Kent-Owens Machine Co.	239
King Machine Tool Co.	77
Kingsbury Machine Tool Co.	235
Laminated Shim Co., Inc.	168
Landis Machine Co.	10-11
Landis Tool Co.	12-13
Langelier Mfg Co.	212
LaPointe Machine Tool Co.	169
LeBlond Machine Tool Co., R. K.	22-23
Leland-Gifford Co.	157
Lempco Products Inc.	240
Lincoln Electric Co.	163
Link Belt Co.	16-17
Linley Brothers Co.	208
Lodge & Shipley Co.	32
Logansport Machine Co.	216

ADVERTISERS INDEX

	Page
Lovejoy Tool Co., Inc.	184
Luers, J. Milton	220
M & N Machine Tool Works	212
Mahon Co., R. C.	217
Mallory & Co., Inc. P. R.	196
Manheim Mfg. & Belting Co.	81
Mansco Grinding Wheel Co.	223
Marsh Stencil Machine Co.	234
McCaskey Register Co.	175
McCrosky Tool Corp.	260
McGraw-Hill Book Co., Inc.	228
Meisel Press Mfg. Co.	256
Micromatic Hone Corp.	172
Modern Tool Works	55
Moline Tool Co.	191
Monarch Machine Tool Co.	159
Moore Special Tool Co.	78
Morris Machine Tool Co.	88
Motch & Merryweather Machinery Co.	215
National Acme Co.	80
National Erie Corp.	259
National Machine Tool Co.	250
Newark Gear Cutting Machine Co.	258
New Britain-Gridley Machine Div. New Britain Machine Co.	3rd Cover
Niagara Machine & Tool Works	70-71
Norton Company	18-19
Oakite Products Inc.	232
Oliver Instrument Co.	216
Osborn Manufacturing Company	165
Ozalid, Division General Aniline & Film Corp.	142
Parker-Kalon Corp.	58
Parker Rust Proof Company	204
Perkins Machine & Gear Co.	186
Philadelphia Gear Works, Inc.	255
Pope Machinery Co.	207
Potter & Johnston Co., Sub Pratt & Whitney Div. Niles-Bement-Pond Co.	25
Pratt & Whitney Div. Niles-Bement-Pond Co.	24
Producto Machine Co.	247
Red Wing Motor Co.	238
Reed Rolled Thread Die Co.	173
Reeves Pulley Co.	84
Reliance Electric & Engineering Co.	199
Revere Copper & Brass Inc.	161
Ruthman Machinery Co.	188
Ryerson & Sons Inc., Joseph T.	170
Sales Service Machine Tool Co.	260
Scherr Co., Inc., George	244
Seneca Falls Machine Co.	42
Sheffield Corp.	139
Sheldon Machine Co., Inc.	216
Shore Instrument & Mfg. Co., Inc.	220
Simonds Abrasive Co.	146
Simonds Saw & Steel Co.	65
Smit & Sons Inc., J. K.	234
Springfield Machine Tool Co.	61
Square D. Co.	251
Standard Oil Co. (Indiana)	73, 74
Standard Pressed Steel Co.	62
Standard Tool Co.	167
Sterling Grinding Wheel Div.	36-37
Strong Carlisle & Hammond Co.	232
Stuart Oil Co., Ltd., D. A.	230
Swedish Gage Co. of America	208
Taft-Peirce Mfg. Co.	226
Tannewitz Works	220
Tennessee Coal, Iron & Railroad Co.	75
Thompson Grinder Co.	213
Timken Roller Bearing Co.	4th Cover
Tomkins-Johnson Co.	209
Towmotor Corporation	189
Union Drawn Steel Div. Republic Steel Corp.	14-15
Unitcast Corp.	244
U. S. Drill Head Co.	212
U. S. Hoffmann Machinery Corp.	193
U. S. Steel Corp.	75, 234
U. S. Steel Export Co.	234
U. S. Steel Supply Company	234
V & O Press Co.	216
Van Keuren Co.	60
Van Norman Co.	8-9
Veeder-Root, Inc.	20
Verson Allsteel Press Co.	221
Vulcan Tool Corp.	59
Waltham Machine Works	238
Warner & Swasey Co.	35
Webber Gage Co.	140
Wells Mfg. Corp.	248
White & Bagley Co.	258
Willey's Carbide Tool Co.	212
Willson Products, Inc.	187
Wilson, K. R.	47
Wilson Mechanical Instrument Co.	238
Wittek Manufacturing Co.	230
Zeh Hahnemann Co.	238

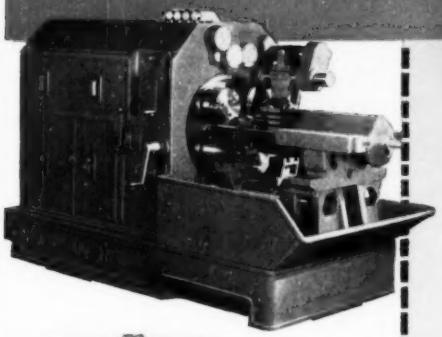
SEARCHLIGHT SECTION
(Classified Advertising)

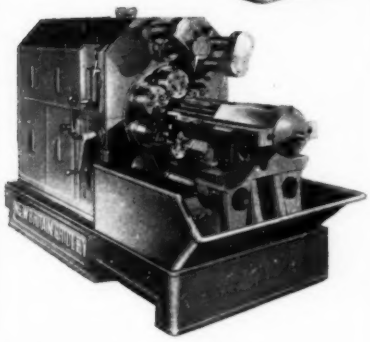
	Page
EMPLOYMENT	
Positions Vacant	261
Selling Opportunities Offered	261
Positions Wanted	261
Selling Opportunities Wanted	261
Employment Services	261
SPECIAL SERVICES	
Contract Work	261
General Pattern Works	261
Slocomb Corp., F. F.	261
BUSINESS OPPORTUNITIES Offered	261
EQUIPMENT (Used or Surplus New) For Sale	261-273

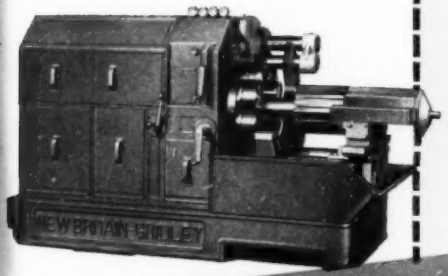
ADVERTISERS INDEX

Aaron Machinery Co.	267
Bennett Machinery Co.	261, 270
Botwinik Bros. of Mass., Inc.	266
Brooks Inc., B. D.	270
Brownell, Hazard	266
Capitol Machinery Corp.	262
Cincinnati Machinery Co.	272
Commercial Grinding & Mfg. Co.	270
Continental Salvage & Machy. Corp.	273
Cox Machinery Co.	270
Daley & Sibley	264
Dony Machinery Co., D. E.	268
Eastern Machinery Corp.	265
Emerman Machinery Corp.	262
Falk Machinery Co.	263
Harrison Machinery Exchange Inc.	261
Hill-Clarke Machinery Co.	269
Hill Machine Co.	272
Howarth Machinery Co.	268
Hyman & Son, Joseph	272
Indianapolis Machy. & Supply Co.	271
Industrial Service Inc.	272
Kings County Machy. Exchange	261
Lang Machinery Co.	270
Lucas & Son Inc., J. L.	268
Meyer Machy. & Equip. Co., Walter H.	273
Miles Machinery Co.	266
Moch, H. R.	261
Morey Machinery Co.	264
National Machy. Exchange	266
O'Connell Machy. Co.	272
Osborne & Sexton Machy. Co.	268
Paul's Machinery Co.	270
Pulverizing Machinery Co.	261
Sandfort Inc., Richard L.	261
Sier-Bath Gear & Pump Co.	273
Simmons Machine Tool Co.	273
United Machinery & Tool Corp.	273
Victor Machinery Exchange	264
West Penn Machinery Co.	272
Wiggleworth Machinery Co.	272
Winston Machinery Co., Inc.	272, 273
Zeeve & Co., Alex.	261, 272

SPECIAL FEATURES...
mean better production methods







NEW BRITAIN *Automatic* 4-6-8 Spindle Chuckers

HYDRAULIC CHUCKING for simple positive control and rapid action. Chucking pressures automatically reduced in finishing positions, if necessary to prevent distortion.

FLAT CROSS SLIDES AND SWINGING TYPE FORMING ARMS make New Britains equally adaptable to heavy cuts and a wide variety of types of work.

SPINDLE STOPPING MECHANISM positions spindle automatically in loading position, or any other position necessary to perform work requiring a dead spindle. A safety device prevents carrier index before completion of chucking operation.

CARRIER LIFTING, LOCATING AND LOCKING MECHANISMS during index preserve initial accuracy by eliminating both wear and weave from the spindle carrier.

DOUBLE INDEX of spindle carrier with loading in two positions permits finishing both ends of a piece in a single cycle, or two pieces per cycle.

ACCELERATED OR DECELERATED MOTION, separate from turret, changes feed rate of any end working tool for different operations. Drill speeders in all positions.

ANTI-FRICTION BALL BEARING on hydraulic chucking distributor eliminates the wear and heat of metal-to-metal contacts and permits high spindle speed.

OPEN END CONSTRUCTION provides complete accessibility to the tooling area, and easy chip removal.

These important mechanical features are the basis for the adaptability and accuracy of New Britain chuckers and the new, better machining methods they make possible. May we send you the portfolio "It Can Be Done." It contains numerous cost histories showing the results in terms of cost-per-piece and pieces-per-hour. Frequent supplements are issued to those who request this valuable service.

349MJ1

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

Production of new TIMKEN® "OO" bearing being increased to meet demand !

. . . opens the way to new standards of accuracy in high precision applications!

Only a few short months ago, The Timken Roller Bearing Company announced a new bearing—the "Double-Zero"—*twice as accurate* as any Timken® bearing previously produced.

And already the new Timken "Double-Zero" bearing, with a run-out tolerance of only 75 millionths of an inch, is raising standards of accuracy in high-speed lathe spindles, grinding machine work heads, gear cutting machines, small precision rolling mills, and other precision applications. And production of the "Double-Zero" is being increased to meet the growing demand.

The extreme accuracy of the "Double-Zero" bearing results from the use of measuring devices of extreme accuracy, specialized machine tools, and improved manufacturing methods. "Double-Zero" quality is further assured by an extra step in manufacture in which a natural and true geometric contact is generated between all rotating parts. This results in a "Generated Unit Assembly" and assures positive roll alignment, long lasting precision, permanent adjustment, and smoother operation.

The new "Double-Zero" bearing is the latest example of Timken leadership in serving the bearing needs of all industry—another reason why it pays to look for the trade-mark "Timken" on every tapered roller bearing you use. For further information write The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

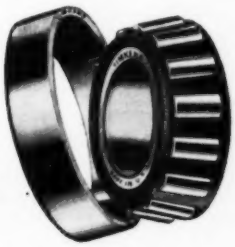
This symbol on a product means its bearings are the best.

A PRECISION TIMKEN BEARING FOR EVERY REQUIREMENT			
CLASS	**"00" (DOUBLE-ZERO)**	**"0" (ZERO)**	**"3" (THREE)**
RUN-OUT	.000075"	.000150"	.000300"
TYPES AVAILABLE	Standard Single Row	Standard Single Row	All types
SIZE RANGE	Up to 10" O.D.	Up to 12" O.D.	Up to 12" O.D.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION